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COMPUTERWORLD

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Comdex accents dynamic growth in micro market

By Eric Bender
CW Staff

ATLANTA — Last week's Comdex/Spring '84 show here highlighted the continuing growth both in microcomputer sales and in the number of vendors serving that market. Of the 851 suppliers here, 158 exhibited products for the first time, according to the show's organizer, the Interface Group, Inc. of Needham, Mass.

Although final figures were not available at press time, the computer dealer show was expected to draw well over 45,000 attendees.

As at last November's Comdex/Fall '83 show in Las Vegas, IBM Personal Computers and compatible machines again this year dominated the exhibit floors. The most prominent contender outside the IBM-compatible fold, Apple Computer, Inc.'s Macintosh, maintained a low profile. Although a number of suppliers introduced hardware add-ons for the Macintosh, few application programs were on display.

With a string of major products announced in the weeks before the show, high-visibility product introductions were scarce. Much interest centered on integrated software packages, with Ashton-Tate's Framework and Lotus Development Corp.'s Symphony drawing the greatest attention.

As usual, several new personal computers claiming IBM compatibility made their debut.

Corona Data Systems, Inc. introduced the Personal Best, an Intel Corp. 8088-based microcomputer. The system reportedly extends the upper range of Corona's hard disk personal computers, offering additional internal memory, floppy-disk-based storage and upgraded display abilities.

A version with two 5¼-in. floppy disk drives, one 10M-byte hard disk drive and

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TOP OF THE NEWS

Older may be better if you're in the market for a mainframe. Now that IBM has cut upgrade prices and has added a performance improvement option, the older versions of the IBM 3080 line might be a better deal than the new X models. **Page 2.**

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Information systems managers get involved in their companies' personal computer acquisition processes only as in-house technical consultants, a survey found. **Page 4.**

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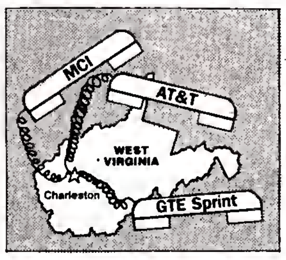

Charleston gets ready for July 15: Eight long-distance telephone carriers — AT&T, MCI Communications Corp. and GTE Corp. foremost among them — are waging a media war to sign up new customers in the West Virginia capital before the equal-access rule takes effect. **Page 11.**

■

A package for Centrex users was made available to the divested Bell operating companies by AT&T Technologies. **Page 81.**

■

Newly arrived in the U.S. is Honeywell, Inc.'s DPS 4, which the company said offers a growth path for Level 62 users. **Page 85.**

■

A sour deal for Apple dealers? They aren't happy about the vendor's plans to sell Macintoshes to 24 colleges and universities. **Page 101.**

Study points to DP fraud at banks, insurers

By Peter Bartolik
CW Staff

NEW YORK — A study of survey data involving 5,127 banks and 854 insurance companies revealed 119 cases of rigidly defined electronic data processing fraud, with perpetrators identified from "almost every aspect of corporate operations, with the preponderance outside the [DP] area."

Those findings were discussed in the "Report on the Study of EDP-Related Fraud in the Banking and Insurance Industries," issued here by the American Institute of Certified Public Accountants and based on the efforts of the institute's EDP Fraud Review Task Force, appointed in 1978.

Following unsuccessful initial efforts to examine the nature and pervasiveness of such fraud, the task force undertook two surveys, one of banks and one of insurance companies, and focused on specific reported fraud cases. The task force noted that it made no projections on the number of fraud cases in the industries and "was aware of some significant cases that were not reported through the surveys and could, therefore, not be included in the study."

The surveys indicated that clerical employees were the most frequent perpetrators of fraud in both industries, but that management and supervisory-level personnel tended to be responsible for the larger frauds that were studied. Systems and applications programmers and operators were moderately prominent in banking frauds, but less prominent in insurance, according to the report.

The report identified 85 banking cases, with 38 perpetrated by clerical personnel, 17 by managers, 13 by DP staffers, eight by tellers and nine by others. Of the 34 insurance cases, 21 were committed by clerical

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TRENDS & DIRECTIONS

Big systems users discovering the strengths of Unix

By John Gallant
CW Staff

Not surprisingly, the programmers and software engineers at Intermetrics, Inc. fully supported management's decision to migrate to the Unix operating system.

Intermetrics currently utilizes Amdahl Corp.'s Universal Timesharing System, a version of Unix that is running under IBM's VM operating system on an IBM 4341 Model 2 processor. That mainframe is the host system for about 15 programmers developing an Ada language compiler for the U.S. Air Force.

Intermetrics shifted its development efforts from IBM's MVS environment to UTS in March 1983. As with most large-system Unix shops contacted recently by *Computerworld*, Intermetrics runs few end-user applications under that multitasking, multiuser operating system. Rather, the focus is on software development at the Cambridge, Mass.-based firm, and for this, Unix provides the ideal working environment.

CW graphic by H. Fling

AT&T and the scientific and educational communities have long embraced Unix as a key weapon in their data processing arsenals, and until recently, the operating system was primarily cloistered in those and other niche markets. These days, however, Unix is increasingly in the limelight.

A variety of vendors has recently introduced Unix software products or has upgraded existing offerings. Newly competitive AT&T has thrown its considerable weight behind Unix with its System V release. Even IBM put a limited seal of approval on Unix with the recent release of a version for its Personal Computer XT.

Originally written for Digital Equipment Corp.'s early PDP-7 minicomputer, Unix was envisioned as bridging the functional chasm between computers by offering complete program portability. Everything from micros to mainframes would be a viable host for Unix, and applications would be utilized across the entire range of processing equipment.

But even its supporters lament Unix's

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NEWSPAPER

Older IBM 3080s may be better deal than X models

By Tom Henkel
CW Staff

While the X models of IBM's 3080 series mainframes offer newer technology and up to 14% greater internal performance than the earlier models, the processors replaced by the X models may be a better deal for users.

Users who stick with the older processors could save as much as $400,000 off the purchase price of new X model processors, industry watchers contend. The reasons are price cuts in model-to-model upgrades and the near give-away performance enhancements announced recently by IBM [CW, May 21].

How the older processors offer better financial deals is somewhat complex. On a direct purchase price comparison, the newer X models appear to offer 2% to 5% better price/performance than the non-X models, noted Mike Chuba, an analyst with the Stamford, Conn.-based Gartner Group. But when IBM announced the X models, it also announced it would no longer actively market the non-X models to new users. Therefore, the only way to buy non-X processors is either on the used market or through model upgrades from IBM. It is through the upgrade process that users can save money.

Appeasing users

When IBM announced the X model processors [CW, Feb. 27], it cut the model-to-model upgrade charges on the non-X 3080 series processors by as much as 10%. At the same time, non-X monthly maintenance fees were reduced 15% in order to bring them in line with the newer systems' maintenance fees. Both moves were obviously made to appease users of the older systems, noted Michael Geran, vice-president of research at E. F. Hutton Group, Inc. in New York.

At the time of the X model announcement, many industry watchers speculated that the residual values of the non-X models would suffer because they could not be upgraded to the newer models. Some industry watchers called the X model announcement a marketing coup because it seemed to squash the burgeoning used market for older 3080s.

In what appears to be a second appeasement to users of older 3080 series systems, IBM two weeks ago announced an optional performance enhancement, which, for $16,000, offers users of non-X models up to 6% greater internal throughput. The option is priced so that IBM cannot possibly make money on the offer, said Charles Greco, an analyst with Framingham, Mass.-based International Data Corp. (IDC).

By adding the performance upgrade to the already reduced model-to-model upgrade prices, users can develop a non-X system that operates in the same performance ballpark as the X processors, but at a much lower purchase price. For example, IBM lists a 3083 Model B processor at $1,735,000. To upgrade that system to a 3081 Model K processor, a special discounted upgrade package is available for $1,230,000. Add to that the $16,000 performance upgrade, and the total price for a 3081 Model K processor is $2,981,000.

By making the same upgrade on the newer X models, the total cost for a 3081 KX processor would be $3,265,000, or $284,000 more than the non-X equivalent. But an IBM spokesman pointed out that the X models can offer as much as 8% greater throughput than similarly configured non-X models with the performance upgrade.

IDC's Greco contends that even by considering the performance difference, the non-X models wind up costing roughly 7% less than the newer X models. Furthermore, Greco noted that users who buy non-X model machines on the used market can get even greater savings.

So why is IBM offering such deals? Some analysts, such as E. F. Hutton's Geran, said it is not uncommon for IBM to beef up performance in the "twilight" of a processor's life cycle. Other analysts suggested that instead of holding what is commonly known as a "fire sale" on outdated hardware, IBM has veiled a price cut in the latest performance upgrade.

Greco, however, speculated that IBM may be having problems with its innovative Thermal Conduction Module cooling units in non-X processors. IBM corrected the problem in the newer X models, Greco theorized, and now it is correcting the problem in the older non-X models through a mysterious performance upgrade.

AT&T makes expected filing for reduced MTS, Wats rates

WASHINGTON, D.C. — AT&T, as expected, filed a revised tariff on May 18 to reduce by an average of 6.1% its rates for Message Toll Service and Wats.

Local telephone companies also filed revised tariffs specifying their charges for providing access to the long-distance networks of AT&T and other interstate carriers.

Besides collecting from the carriers, the local companies are imposing an access fee of up to $6/mo per line on business customers who communicate with local-exchange networks through multiple lines.

Rates effective May 25

The new rates filed by AT&T and the local telephone companies carried an effective date of May 25. The tariffs appeared to satisfy requirements laid down earlier by the Federal Communications Commission [CW, May 14]. The FCC said that if there were no problems, it would allow the tariffs to go into effect on May 25.

"We don't believe we will be able to earn the 12.75% rate of return" authorized by the FCC, said Morris Tanenbaum, president of AT&T Communications, which is the division within AT&T providing interstate communications services. His statement might mean the company will ask for a rate increase in the near future.

AT&T Communications, in a letter accompanying the tariff, said the 6.1% reduction in rates for international telephone service should be deferred until the fall, when the company intends to restructure its international rates.

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CW at Comdex: No single operating environment is emerging to link integrated microcomputer software packages to each other or to other applications, a software consultant says . . . Televideo Systems, Inc. announced the Personal Mini to tie together IBM Personal Computers . . . Industry analysts see Unix's future as an operating system standard for single-user microcomputers in doubt/**8-9**

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Apollo adds Lisp version on Domain

By Paul Gillin
CW Staff

CHELMSFORD, Mass. — Apollo Computer, Inc. today announced a version of the Lisp programming language that runs on the company's Domain series of workstations.

Domain Lisp is not intended to fit into the dedicated Lisp workstation market, but rather to be used for "practical applications," said Mark Hatch, Lisp product manager.

Hatch said that "it's only been just recently that applications of Lisp to artificial intelligence have started to pay off in terms of natural language systems and expert advisers." For example, Domain Lisp could be used to enhance computer-assisted design applications to incorporate some problem-solving features.

Domain Lisp is said to be highly integrated with Apollo's Domain Language System, a line of languages and utility tools that includes Fortran, C and Pascal. The capability allows portions of programs to be written in different languages and then combined into a single application. The language conforms to the Standard Lisp report of 1979 and is a compatible superset of the Portable Standard Lisp developed at the University of Utah.

The environment contains an interpreter for checkout and prototyping and an optimizing compiler. Apollo-based tools are available for Domain Lisp applications in the areas of expert systems, special-purpose graphics and robot vision software, a spokesman said.

Access to all operating system calls is furnished, as well as a history facility to record a session's interactions. Macro definition tools help convert existing Lisp programs to the Domain processing system.

Other features include save/restore environment commands, "efficient compacting garbage collection" to maximize storage utilization, a cross-call language capability and a dynamically scoped binding environment, the spokesman said.

Systems support is provided by Apollo's demand-paged, virtual memory operating environment, which includes Apollo's Aegis operating system and AUX, an implementation of Unix System III with Berkeley extensions.

The Domain Language System's common-code generator separates pure, position-independent code from impure data areas, allowing all programs to be reentrant, the spokesman added. Multiple concurrent processes share common 1,024M-byte program pages.

Domain Lisp runs on all Apollo systems, including the DN300, the DN320 with floating-point hardware and the high-end DN460 and color DN660 workstations. Communications support includes IBM 3270 emulation and Houston Automatic Spooling Program, X.25 and Ethernet.

The language implementation is priced at $1,850 per node and $15,500 per site, up to 100 nodes. Apollo is located at 15 Elizabeth Drive, Chelmsford, Mass. 01824.

DP manager's role in micro buys limited

By Jeffry Beeler
CW West Coast Bureau

LOS ANGELES — They seldom initiate their companies' requests for personal computers. Nor do they typically authorize the final purchases.

But information systems managers do contribute heavily to the personal computer acquisition process in at least one important respect: They rank among their firms' chief sources of advice about which of the many available microcomputer models is best suited to do a particular task.

That picture of where MIS directors fit into the corporate world's microcomputer procurement scheme emerges from the results of a recent survey conducted jointly by Arthur Andersen & Co. and Houlahan/Parker Co., a market research firm. The survey examines how microcomputers are used and regarded in 308 companies, including more than 150 corporations with annual sales volumes averaging $133 million.

The study's goals

One of the study's many goals was to find out at what level in the executive hierarchy the evaluation and selection of personal computers typically takes place. In large companies, requests to acquire micros are usually initiated by executive and financial vice-presidents, controllers or managers of end-user departments, according to the survey. In only 10% of the big corporations did purchase requests originate with information systems managers.

MIS directors apparently exercise an even smaller voice in authorizing personal computer purchases. Among the survey's largest respondents, only 5% of the DP managers reported any involvement in final authorizations.

But although information systems managers are only minimally involved at the beginning and end of the personal computer acquisition cycle, they play a comparatively active role during the middle phase of the process.

Exactly 20% of the large corporations participating in the survey listed their MIS directors as one of their main sources for recommendations about which micro model to buy. Other major sources of technical advice about microcomputer systems include user department managers and financial vice-presidents.

In essence, then, the main role of information systems managers in the personal computer acquisition process is to serve large companies as in-house technical consultants, the survey showed.

Success and failure

In other results, the study found business micros to be an "outstanding success" in most of their initial applications — but a comparative flop in subsequent tasks, according to Arthur Andersen partner Bob Leach.

Most end users, he said, buy microcomputers to solve a "single isolated problem." But the results often prove so "satisfying" that they soon try to add a second application or user to the system.

"That's usually when they begin stumbling into problems they hadn't foreseen at the outset," Leach said. When users start adding multiple applications to their personal computers, they cease to be "islands of automation" and "become part of a whole integrated information systems solution."

Demands networking skills

But the integration of micros into existing systems demands networking skills that far exceed the technical competence of most inexperienced end users, Leach said. The result of this dearth of networking expertise is that shortly after establishing their initial beachhead in a company, microcomputers usually encounter a daunting technological barrier that slows their proliferation to a crawl or worse.

Leach's observations are borne out by the survey results, which show the current penetration of personal computers in the big business world to be broad, but shallow.

Although more than 70% of the large corporations that responded to the survey claimed to be using micros, three-fourths of the companies had installed only 10 or fewer units, the survey indicated.

FRAUD

from page 1

personnel, nine by supervisors and four by others.

"In almost all cases," according to the task force, "the fraud occurred during normal transaction processing cycles. . . . Fraud occurred in both batch and on-line systems."

The task force concluded that a variety of methods was used to conduct the frauds, but "few perpetrators used sophisticated techniques; many took advantage of weaknesses in the system of internal accounting control." A common weakness among the reported cases was inadequate segregation of employees' duties.

Losses ranged up to several million dollars, but a majority of the cases involved amounts of $25,000 or less, according to the report. Most frauds were perpetrated in the input of data, where "perpetrators generally introduced or created unauthorized input or manipulated otherwise proper input."

Duration of fraud

The duration of time in which a fraud occurred varied from one day to several years. The task force found that "frauds perpetrated by supervisory or management personnel tended to last longer than those perpetrated by clerical personnel."

The primary objective of most perpetrators was to obtain money, but in some cases data was manipulated to show a better performance record. "For example, one bank loan officer extended due dates on loans to show a good record of loan collections."

One-third of the fraud was reportedly detected through normal accounting procedures or audits; an additional one-third was detected through nonroutine events such as by accident, unusual activity of the perpetrator or a tip-off. In about one-fourth of the cases, the frauds were detected following a customer complaint; virtually all of these cases were in the banking industry.

> *'A variety of methods were used to conduct the frauds, but "few perpetrators used sophisticated techniques; many took advantage of weaknesses in the system of internal accounting control."'* — EDP Fraud Review Task Force.

In banks, the most frequent type of fraud involved misposting or misdirecting customer deposits. Other schemes included crediting loans to borrowers who never received the funds and making unauthorized extensions of credit limits and loan due dates.

The most frequently used scheme in the insurance industry was generating claim payments to the perpetrator or to his accomplices. Another prominent scheme was generating refunds or reductions of policy premiums.

The report is available free from the American Institute of Certified Public Accountants, 1211 Ave. of the Americas, New York, N.Y. 10036.

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Raytheon Data Systems' demise surprises analysts

By Peter Bartolik
CW Staff

NORWOOD, Mass. — The decision by Raytheon Co. to terminate its Data Systems Division here came as a surprise to analysts who expected the company to use Convergent Technologies, Inc.'s workstations to revitalize its sagging position as the top supplier of IBM 3270-compatible terminals.

Raytheon announced on May 18 that it would terminate the division because of difficulties in profitably manufacturing commercial data systems and because of delays in deliveries "of purchased assemblies from suppliers." Raytheon spokesman A. Newall Garden said the company had anticipated Data Systems would market new products based on Convergent's engines.

Garden said the division, after determining that internal development was not moving ahead fast enough, "wanted to leapfrog" by purchasing Convergent equipment. "Convergent was later than they should have been, and we had slowed down to wait for their products," he said.

Signature 8200

Earlier this year, the Data Systems Division announced the Signature 8200, an office system based on Convergent's multiuser microcomputer and aimed at integrating the division's existing terminal and word processing businesses [CW, Jan. 23].

Raytheon said the Raytheon Data Services and Leasing Co. will provide service and software support for current users. Fewer than 100 of Data Systems' present employees are expected to join the new service and leasing company, while 1,600 employees worldwide will be phased out over the next few months, including some 650 based in Massachusetts. The Norwood facility will be occupied by Raytheon's Equipment Division.

Wall Street reportedly reacted positively to the news, with Raytheon stock staying relatively stable in the face of a broad decline. Data Systems contributed only about 5% of Raytheon's total revenues in 1983 and sustained a net loss of about $23 million. For the first four months of 1984, the division lost $6.2 million. Raytheon said it will absorb an estimated after-tax loss of $95 million to accomplish the division's phaseout.

Once No. 1

Raytheon's Data Systems Division had for several years been the No. 1 supplier of terminals compatible with IBM's 3270 CRT terminal. At the end of 1982, according to International Data Corp. (IDC), a Framingham, Mass.-based research firm, Data Systems had an installed base of 176,150 Model 3270-type terminals, representing 9% of the market, behind IBM's 59% market share. Since then, however, it "had dropped down to third or fourth in terms of installed base," reported Frank Gens of the Boston-based Yankee Group.

The company was even less successful in the area of word processing, despite its 1978 acquisition of Lexitron Corp., an early winner in the area of stand-alone word processors. According to IDC office automation analyst Molly Upton, "it was the old story where they bought a company, put in new management and couldn't put new products out."

Another IDC analyst, David Brown, said potential customers, following the acquisition, "couldn't identify with Lexitron products anymore."

Raytheon's Data Systems Division has supplied, worldwide, more than 200,000 Model 3270-type terminals, with more than 100,000 in use in the airline reservations field. According to Gens, "That's great market penetration, but it increases your exposure if the [airline] industry is not doing well, as in 1982 and 1983."

Data Systems, Gens added, "was in a nasty situation for any business. Its entire product line was going through a life-cycle transition."

The 3270-compatible terminal market has shifted dramatically in the past two years, Gens said. IBM brought out a lower-priced terminal, the 3178, and high-end products are being developed around microcomputers. As a result, the low-end of the 3270-type market "is a break-even business at best, but you have to have a presence in the low-end [market] to be competitive."

The profit for terminal manufacturers lies in products based around microcomputers compatible with IBM's 3270 Personal Computer, but there are twice as many competitors in that area, Gens added.

It was this personal computer direction that Data Systems was expected to take with Convergent's products, Gens said.

Many vendors are positioned to grab chunks of Data Systems' potential market, according to the analysts.

"There are at least 20 companies in that market," noted Mary Lynn of IDC. She added that many vendors who were traditionally suppliers of communications products are now entering the market.

Heading the list of terminal suppliers are ITT Courier Terminal Systems, Telex Corp. and Memorex Corp.

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How Others See Us . . . and Report

May we refer you to the closing statement in DATAPRO 70 February 1984 — 70E-528-01c, Software Report. Subject — FDR/COMPAKTOR/ABR, Innovation Data Processing Incorporated: "The general consensus of opinion is that FDR is the best product on the market, which is also reflected by the very large number of users, and, with the constant enhancements made by the vendor, it will probably remain in that position."

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overall obscurity. Command names are cryptic, they say, and it lacks the so-called user-friendly features incorporated in other general-purpose operating systems. They question Unix's ability to handle high-volume transaction processing and its usefulness in supporting end-user applications without specifically tailored interfaces or front ends (see stories below).

Reservations not a barrier

Despite those reservations, an increasing number of large-system users are looking to Unix to handle specialized tasks, such as software development.

"We have found Unix to be the best development environment," said Intermetrics software engineer Abraham Shenker. "Unix offers a tremendous set of programming tools, including stream editors, source code control facilities and programs for configuration management. Its hierarchical file system also allows us to better organize projects. It gives people local areas in which to work. They don't have to know about all the other files in the system when they are working in those areas."

Shenker's comments were echoed by Bruce Hunter, senior software engineer and Unix system administrator for Interstate Electronics Corp. in Anaheim, Calif. Interstate develops software under military contracts for such applications as missile tracking. Under UTS, the firm supports a development staff of nearly 100 programmers and engineers on five virtual machines under IBM's VM operating system on an Amdahl 470V/7 mainframe.

Interstate's team relies heavily on Unix's ability to create "make" files, which automate the source file compilation and linkage involved in any major software development effort. In addition, the staff utilizes what Hunter described as Unix's exceptional documentation facilities and the system's Source Code Control System (SCCS).

"SCCS keeps the number of versions of any program to one by maintaining an encoded history of the program since the date of its origination," Hunter explained. "It also allows you to reconstruct a program as it appeared at any point in its history. The lesser utilities, such as the facilities for comparing for differences in files and editing, are all normal parts of Unix's programming environment that we utilize every day." Hunter maintained that "there is really no comparison between Unix and conventional operating systems. Those systems can't begin to approach the versatility of Unix. They don't have the literally hundreds of built-in programming tools that Unix provides. It is an ideal system for people who are [oriented toward] programming or system management."

CW graphic by H. Fling

Best of two worlds

Running Data General Corp.'s MV/UX version of Unix under DG's AOS/VS operating system on an Eclipse MV/8000 superminicomputer, Charles Barnaby says he can utilize the best of two worlds. A simple instruction entered through the command line interpreter of AOS/VS allows Barnaby to access the Unix C shell and invoke any of Unix's utility programs.

Barnaby is vice-president of Berkeley Solar Group, a building energy and conservation consulting firm in Berkeley, Calif. In addition to its architectural consulting duties, Berkeley Solar's staff develops modeling and analysis software that is sold outright and offered through time-sharing on the MV/8000.

"As an environment for program development and text manipulation, Unix is very powerful," Barnaby said. "It has this amazing piping facility that allows you to string programs together very elegantly. You can take the output from one program and plug it into the input of another to set up a series of operations."

Compared with IBM systems like TSO, Barnaby said, "Unix is miraculous. It gives me access to programs designed specifically for developing code."

But learning to use Unix is no small task, he added: "I'm taking advantage of Unix for maintaining source code, searching file strings — that type of thing. But I'm accessing those tools out of AOS/VS. The user interface to Unix is much inferior to the DG system. AOS/VS is much easier to use and learn, and it provides better error messages. It's clear that the marketing types never got hold of Unix to smooth it out for wider use."

Lee Steinbrenner, senior software engineer for ITT Courier Terminal Systems, Inc., countered that claim: "I think Unix offers better continuity throughout its entire command structure, compared [with] other operating systems I've worked with, including systems like TSO and CMS."

ITT Courier in Phoenix runs UTS on a National Advanced Systems, Inc. AS/9050 mainframe under IBM's VM/SP operating system. Developing switching system software for ITT Courier's IBM-compatible terminals and controllers, some 280 programmers and engineers in Steinbrenner's production development area work on two virtual UTS systems under VM/SP. The software is written in C and cross-compiled to applicable microprocessors.

"The Unix environment is state-of-the-art," Steinbrenner said. "If you have a lot of people doing development tasks, Unix is a wonderful tool to work together on. In addition to software development, we plan to do some emulation and simulation work, maybe even some [computer-aided design and manufacturing]. We would use Unix as the front end for those applications."

With all the power and flexibility attributed to Unix by its users, why does the operating system enjoy only limited popularity at the high end?

"Unix has been a fairly unstable system; it's changed a great deal in recent years," said Intermetrics' Shenker. "It hasn't been the stable environment that is really needed for application development."

Moreover, he said, "Efficiency is part of the reason. Unix will never be as good as a system that has contiguous files and better batch processing capabilities."

How useful Unix? End users divided

Unix is seen by some as the ideal environment for software development, but users are divided over its usefulness as a proper support for end-user applications.

According to Charles Barnaby, vice-president of the Berkeley Solar Group in Berkeley, Calif., the operating system's functions are often confusing to time-sharing clients who want to develop applications or access programs on Berkeley Solar's Unix-based Data General Corp. Eclipse MV/8000 superminicomputer.

"Unix is basically written for computer professionals and, to a large degree, it is overhyped for the man in the street. I wouldn't take on the task of teaching someone to use it," Barnaby said.

Furthermore, "most heavily loaded Unix systems are quite slow, and that makes them inappropriate for transaction-oriented applications."

User difficulties can be circumvented by simply designing an interface — or front end — that hides the operating system, according to Bruce Hunter, Unix system administrator for Interstate Electronics Corp.

"You must develop a software interface that masks Unix so it doesn't become apparent to a user accessing an application. That type of user-friendliness is up to the systems programmer to provide. But it is just as easy to provide that friendliness under Unix as it is with any other operating system," Hunter said.

Pay & Save, Inc., which operates a chain of more than 300 retail outlets, is currently installing NCR Corp.'s Unix-based Tower 1632 minicomputers in its West Coast stores. Programmer Paul Barham is part of a design team that is developing applications for those processors on the company's main Tower system at its Seattle headquarters.

"We have quite a few end users on the system, and they don't even know what Unix is. When they log on, we shunt them straight into our Cobol-based applications," Barham said.

Packages for Unix no problem now

The perception that few software packages are available for use with Unix is an outdated one, according to Bruce Hunter, Unix system administrator for Interstate Electronics Corp.

"There is an awful lot of good software that has found its way into the Unix marketplace," Hunter said. "In the past couple of years, many companies have moved from programming packages in assembly to programming primarily in higher level languages, such as C and PL/I. That makes the software extremely easy to port to Unix."

Lee Steinbrenner, senior software engineer for ITT Courier Terminal Systems, Inc., agreed that there is no lack of Unix-compatible third-party software. "However," he added, "we are running [Amdahl Corp.'s] UTS, so a lot that is available has to be ported to that version of Unix. We either have to buy the source code or convince the vendor to do the port for us.

"That can be a problem sometimes," Steinbrenner said, "but most vendors are quite willing to provide the source code, and the porting itself is a very simple task."

Abraham Shenker, software engineer for Intermetrics, Inc., said his firm makes use of an informal network of Unix users to obtain information on available software. "We utilize the so-called 'notes' network, which is a loose communications network that operates over telephone lines between literally thousands of Unix systems. You can put in a request for a certain type of software, and somebody on the network will usually send you information or even the source code to a program they have already written."

Savvy Unix people don't come cheap

Software development under Unix requires personnel with experience in the use of that operating system — experience that is often hard to find and costly to employ.

"If you want good Unix people, especially at the administrative level, you've got to be willing to pay for them," said Bruce Hunter, Unix system administrator at Interstate Electronics Corp. "It's a scarcity situation. For example, systems programmers with Unix backgrounds command premium pay."

Interstate, which migrated to Amdahl Corp.'s version of Unix in September, initiated a massive education program to acquaint some 60 programmers with Unix after installing it. For out-of-house Unix experience, Hunter looks to recent college graduates.

"For new hires, the best source of people is the colleges. The graduates are already experienced in Unix. They don't have to be reeducated, they just have to learn the idiosyncracies of our dialect of Unix," Hunter said.

For Lee Steinbrenner, senior software engineer for ITT Courier Terminal Systems, Inc., filling an opening in his Unix-based software development area takes a minimum three months, on the average. "We face a real problem finding personnel with Unix experience. There are very few qualified people available to fill the slots we have open."

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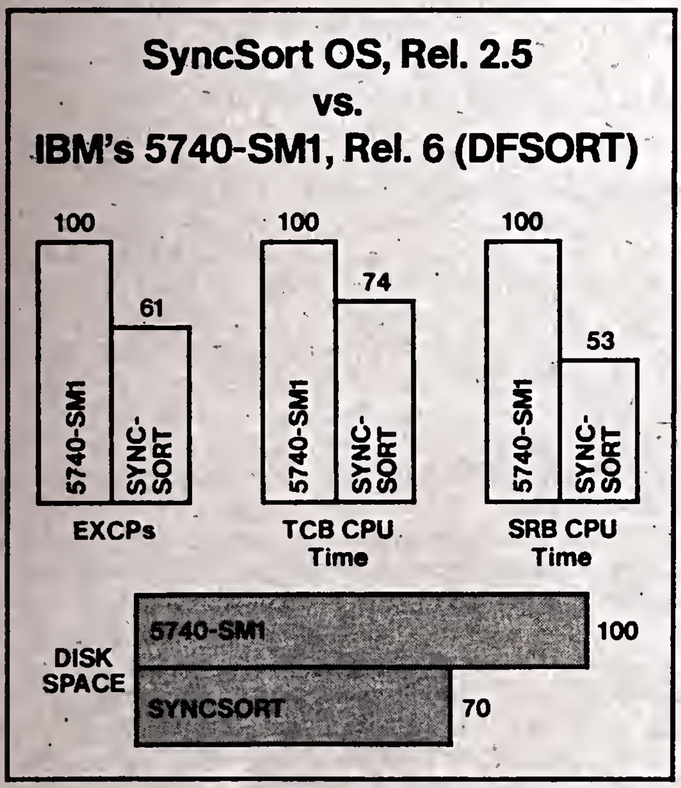

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Common micro environment seen lacking

Analyst cites flood of unlinked software packages

CW AT COMDEX/SPRING '84

By Eric Bender
CW Staff

ATLANTA — Despite the flood of integrated microcomputer software packages, no single, standard operating environment has emerged to link those packages to each other or to other applications, software consultant Esther Dyson of Edventure Holdings, Inc. commented here last week.

A standard operating environment would integrate programs from numerous vendors, providing common user interfaces and data transfer procedures, Dyson said during a session at Comdex/Spring '84.

This approach will offer important benefits for both users and software developers, but next-generation integrated products, like Ashton-Tate's Framework, are coming to market without being designed for a common environment, according to Dyson.

Microsoft, Inc.'s Windows, often seen as the most likely candidate to serve as a standard operating environment, has been plagued by development delays, Dyson observed. "Windows would have been a good standard if it were not too late," she said.

Because Windows has dragged beyond its announced April shipment date to developers, many software firms have decided to take their own approaches, she added.

> *'Windows would have been a good standard if it were not too late.'* — Esther Dyson, Edventure Holdings, Inc.

Visicorp's Vision, shipped last December, also has been positioned as a standard environment "and probably offers the greatest integration," according to Dyson.

To complicate matters further, she said, some new integrated packages, such as Lotus Development Corp.'s Symphony, although not billed as operating environments, are designed to accept add-in software modules from third-party vendors.

Quarterdeck Office Systems' Desq does link-varied applications, but "you still have to go through the old transfer routines," Dyson noted. "Desq has automated that, but you don't have the underlying commonality."

Another panelist comments

Another session panelist, John Merson of the Computer Factory in New York, noted that Desq "appeals to a subset of our customers" who are experienced users and want to continue running their favorite programs.

Outside the range of machines based on the Intel Corp. 8086 family of chips, Apple Computer, Inc. does offer a standard operating environment for its Macintosh, Dyson commented.

"Software developers must obey the [Macintosh's] conventions," she said. "This is pretty restricting if you think you're a genius, but from the user's point of view, it's terrific."

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512K bytes of random-access memory (RAM) will cost $5,995, the company said. Corona is based in Westlake Village, Calif.

Besides announcing the Personal Mini (see story at right), Televideo Systems, Inc. of Sunnyvale, Calif., unveiled the Telecolor PC, a personal computer offered with 256K bytes of RAM and a 12-in. color screen.

A floppy-disk-based Telecolor PC will sell for $3,295, while a hard disk model will cost $4,795.

Xerox Corp. announced a Disk Expansion Module for the Xerox 16/8 Professional Computer, which offers file transfer capabilities between operating systems, including Digital Research, Inc.'s CP/M and CP/M 86 and Microsoft, Inc.'s MS-DOS.

This setup provides functional compatibility with IBM Personal Computers, the Rochester, N.Y., vendor said.

A dual-floppy configuration costs $1,050, while a setup with one floppy disk drive and a 10M-byte hard disk drive sells for $3,050.

Another system not boasting full IBM compatibility came from Morrow, Inc., which introduced a 9-lb portable unit built around a Harris Corp. 80C86 Cmos chip. Morrow's Pivot features 128K bytes of RAM (expandable to 512K bytes) and a 16-line by 80-char. LCD.

The price of the system, which runs MS-DOS, starts below $2,500.

Among a host of communications offerings launched at Comdex/Spring, Digital Communications Associates, Inc. of Norcross, Ga., broadened its line of Irma micro-to-mainframe products with several additions. One of these, the Irmacom printed-circuit board, is said to allow an IBM Personal Computer to emulate a variety of IBM controllers and terminals.

Irmacom is available in five models; the board and one diskette will sell for $895.

CORRECTIONS

The MDC-350 and AIC-525 diskette certifiers and the ADC-525 diskette copier listed in the Auxiliary Equipment category of the May 21 Microcomputer section mistakenly said the products were announced by Hesley Corp.

The correct vendor of those products is Certel, Inc., which is located at 42650 Christy St., Fremont, Calif. 94538.

In "Novel recruiting methods targeting DP professionals" [CW, May 14], a comment that should have been attributed to employment recruiter Steve Burns, who is employed by Fox-Morris Personnel Consultants, Inc., was mistakenly attributed to David E. Moran Jr., who works for General Employment Enterprises, Inc.

It was Burns, not Moran, who said he would like to hold a drawing for an automobile, and it was an office in Burns' firm that once held a drawing for an IBM PCjr.

Micro Data Base Systems, Inc.'s Knowledge Manager [CW, April 16] is designed for processors that run IBM's PC-DOS, Microsoft, Inc.'s MS-DOS or Digital Research, Inc.'s CP/M 86 operating systems.

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MCDONNELL DOUGLAS

Personal Mini from Televideo ties IBM micros

By Paul Korzeniowski
CW Staff

ATLANTA — Attempting to leapfrog the IBM Personal Computer line, Televideo Systems, Inc. came to the Comdex/Spring '84 show here with the announcement of its Personal Mini, which connects 16 IBM Personal Computers or compatible microcomputers into a multiuser system.

The heart of the Personal Mini is the PM/16, the central processor, which includes an Intel Corp. 80186 microprocessor operating at a speed of 8 MHz; 256K bytes of random-access memory (RAM), expandable to 512K bytes; Televideo's Infoshare operating system; a 46M-byte hard disk drive; a 1M-byte, 5¼-in. floppy disk drive; a parallel port and a serial port.

PM/16 permits each IBM Personal Computer or compatible micro to function as a distributed data processor; to process individual applications locally; and to share central data files, programs and peripherals. Infoshare reportedly features hierarchical, multiuser file structure, file locking, record locking, print spooling and on-line help.

The system runs applications designed for Versions 1.1, 2.0 and 2.1 of IBM's PC-DOS operating system. "All single-user applications run on this system," according to Sun R. Cho, vice-president of marketing for Televideo's systems division. "The few multiuser PC-DOS applications available — for example Ashton-Tate's multiuser Dbase II — are ideally suited for this system.

"We think there is a two- to three-year window before IBM will announce multiuser capabilities or a network for its microcomputers," Cho said. "We intend to provide users with a solution to the problem of Personal Computers sharing data."

The Personal Mini PM/16 costs $8,995, while an adapter card that connects any IBM Personal Computer-compatible workstation to the PM/16 sells for $199 per card. Televideo plans to begin shipping the system at the end of June.

The company also announced that it has begun shipping two IBM Personal Computer-compatible portable microcomputers: TPC IIS and TPC IID. The company had announced TPC IID at Comdex/Fall '83 last November. Before shipping the product, the company expanded TPC IID's RAM from 128K bytes to 256K bytes and lowered its price from $2,995 to $2,695.

The machine features an Intel Corp. 8088 microprocessor, 256K-byte RAM, 640- by 200-pixel resolution, an RS-232 serial port, a parallel printer port and two single-sided, double-density disk drives with 360K-byte storage.

The TPC IIS is the same machine as the TPS IID, but it has only one disk drive and costs $2,395.

Televideo Systems is located at 1170 Morse Ave., Sunnyvale, Calif. 94086.

Analysts skeptical about Unix as micro standard

CW AT COMDEX/SPRING '84

By Paul Korzeniowski
CW Staff

ATLANTA — While some claim Unix has emerged as a standard on supermicrocomputers, its future as an operating system standard for single-user microcomputers is very much in doubt.

That consensus was voiced here last week by industry analysts at a Comdex/Spring '84 seminar called "Unix: A Standard?"

"In the last four years, there have been 70,000 microcomputers with Unix or a Unix derivative sold," noted Mark S. Ursino, president of Issaquah, Wash.-based Technology Services Corp., a computer services and consulting firm. To illustrate Unix's relatively shallow penetration in the micro arena, he noted that "Apple [Computer, Inc.] shipped 70,000 Macintoshes in four months."

Analysts cite reasons

Analysts cited a number of reasons for the slow acceptance of Unix by the microcomputer industry. "There hasn't been a significant Unix system in the retail market," said Ann L. Winblad, executive vice-president at Open Systems, Inc. "IBM's endorsement of [Microsoft, Inc.'s] MS-DOS played the key role in encouraging software developers to write software for MS-DOS."

Moreover, AT&T has prevented software developers from helping Unix emerge as a standard, Ursino claimed. "AT&T refuses to provide adequate tools and support to software developers."

Technical shortcomings were also cited as a hindrance to Unix's acceptance as a microcomputer standard. While AT&T claims that Unix is a universal operating system, applications cannot be moved from one version of Unix to another version, claimed John Little of Multi Solutions, Inc. Little's firm produces the S1 operating system, a Unix competitor.

Little claimed that Unix possesses limited functionality, inadequate networking capabilities, a poorly structured file system, unfriendly user interfaces and minimal security procedures.

Winblad listed a number of developments that may presage microcomputer market acceptance of Unix. These include a projected growth of the multiuser microcomputer market; the increasing number of programming languages being ported to Unix; use of Unix by next-generation microprocessors, such as Intel Corp.'s 80286; growing acceptance of the C programming language; and the emergence of sophisticated microcomputer users.

"As users look to share data with a network or a multiuser system, they will realize that attaching a dumb terminal to a computer is less expensive than buying network hardware and software," Winblad predicted.

None of the panelists was certain of Unix's future. It could become either the industry's next de facto microcomputer standard, or the most widely publicized, yet seldom used, operating system in history, according to Winblad.

DEC unifies micro efforts

CW AT COMDEX/SPRING '84

ATLANTA — Digital Equipment Corp. has created a Business Computer Group to handle all small-business sales, the company announced at Comdex/Spring '84 here last week.

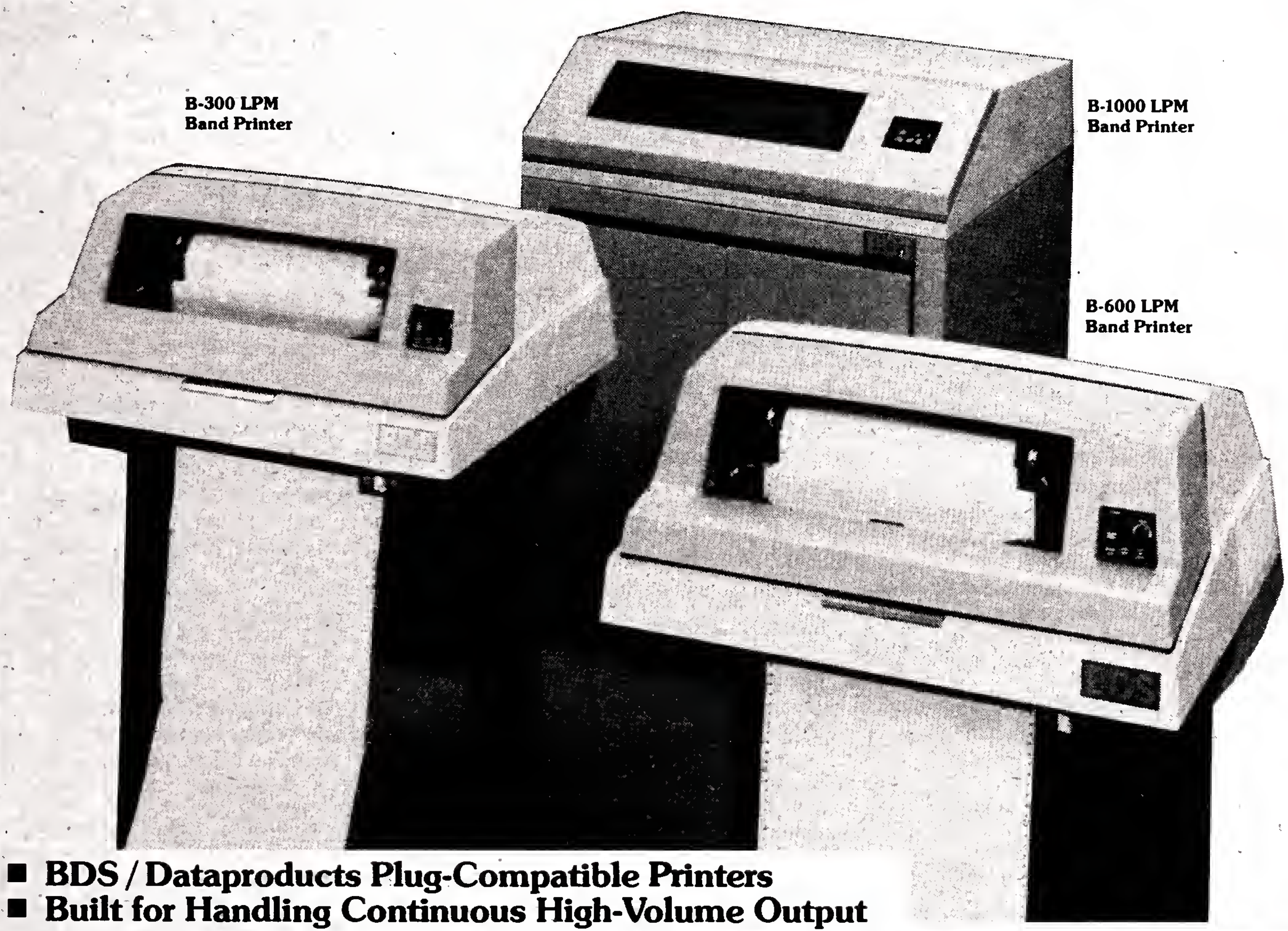
The new organization combines three existing groups: Commercial OEM, Small Business (the company's business centers) and the retail operation of the Personal Computer Group.

Direct sales of the Personal Computer Group are being handled by DEC's strategic marketing groups.

The Business Computer Group, headed by DEC Vice-President Ward MacKenzie, will be fully formed by July 1, according to the company. It will target businesses with annual sales under $100 million, according to group marketing manager John O'Keefe, who said the restructuring will not affect sales to major accounts.

DEC began shifting responsibility for direct sales of personal computers from the Personal Computer Group to the strategic marketing groups last year, O'Keefe said. "Historically, that's the way DEC moves once a product line is established," he noted.

Joel Schwartz, vice-president of the Personal Computer Group, will assume a new position within the company in July.



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Senate poised to choose office automation vendor

By John Desmond
CW Staff

> *'It's taken a while to get these older people — I'm one of them — to use these things. The time has come.'* — Patrick Sarman, staff member, Senate Committee on Rules and Administration

WASHINGTON, D.C. — The Senate Committee on Rules and Administration has narrowed from 32 to six the number of companies being considered to bring offices of the elite 100-member body into the information age.

A final decision on awarding the office automation contract to one or more vendors is likely next week, according to Patrick Sarman, a staff member of the Senate Committee on Rules and Administration.

The main applications of the automated systems will be word processing, scheduling for the senators and their staffs, spreadsheets for office budgeting and electronic mail. "We are currently not automated in any way," Sarman said. "We are going to burn our quills."

He added, "In effect, we have 100 businesses here; everyone does everything their own way."

The most automated machines in Senate offices now are correcting IBM Selectric typewriters and a few memory typewriters; 95% of the paperwork in each office is processed by hand.

The decision was made to go with an integrated system featuring minicomputers in each office, rather than a nonintegrated, microcomputer-based system, Sarman said. Each office will have access to legislative data bases from the Senate Computer Center and the Library of Congress; such access is now available from central terminals.

The six vendors who were asked to perform test demonstrations are M/A-COM Sigma Data, Inc. of Rockville, Md., and Inslaw, Inc. of Washington, D.C., both systems integrators; and Data General Corp., Prime Computer, Inc., Honeywell, Inc. and Digital Equipment Corp.

In a meeting last week, the Rules and Administration Committee requested information on the lifetime costs of the proposed systems, whose costs have been estimated to range from $22 million to $25 million over a three-year span, according to Ron Hastings of Prime.

Whether multiple vendors or a single vendor should provide automation for the Senate is also an issue. While some argue that a single system would be easier to maintain, Sarman is for multiple vendors. "With a single contract, the vendor has no incentive to give excellent service," he explained. "With multiple vendors, you have incentive."

Though a correspondence tracking system is not being requested in the automation proposals, eight senators from large states have asked that a tracking system be provided with the new automation system.

Laurence Klaben of Inslaw said his company now offers such a service to 20 House members on a time-shared basis.

"We're the only one of the six companies that brings this kind of experience to the Senate proposal," Klaben said. However, two companies have pilot automation systems at work in the Senate. Honeywell now provides pilot automation in the offices of Sen. Edward Kennedy of Massachusetts and Sen. Robert Dole of Kansas, who is a member of the Rules and Administration committee.

DEC is providing pilot automation in the offices of Sen. Gordon Humphrey of New Hampshire, Sen. Bill Bradley of New Jersey and Sen. James McClure of Idaho, also a member of the committee.

Sarman said results of the automation tests were encouraging. "Productivity increased dramatically, especially when it came to speechwriting," he said, noting that speeches often must be typed over and over to incorporate changes, a frustrating task to perform manually.

Asked why it has taken the Senate until now to seek office automation methods, Sarman said, "It's taken a while to get these older people — I'm one of them — to use these things. The time has come. It's here and now."

While the Senate office automation contract would be a prestigious one to win, there is a hitch: the request for proposals states that a company cannot refer to the Senate in advertising.

However, Robert Mague of DG said the contract has "strategic importance."

Other members of the 12-member committee include Sen. Howard Baker of Tennessee, Sen. Robert Byrd of West Virginia, Sen. Jesse Helms of North Carolina, Sen. Clairborne Pell of Rhode Island and Sen. Daniel Inouye of Hawaii.

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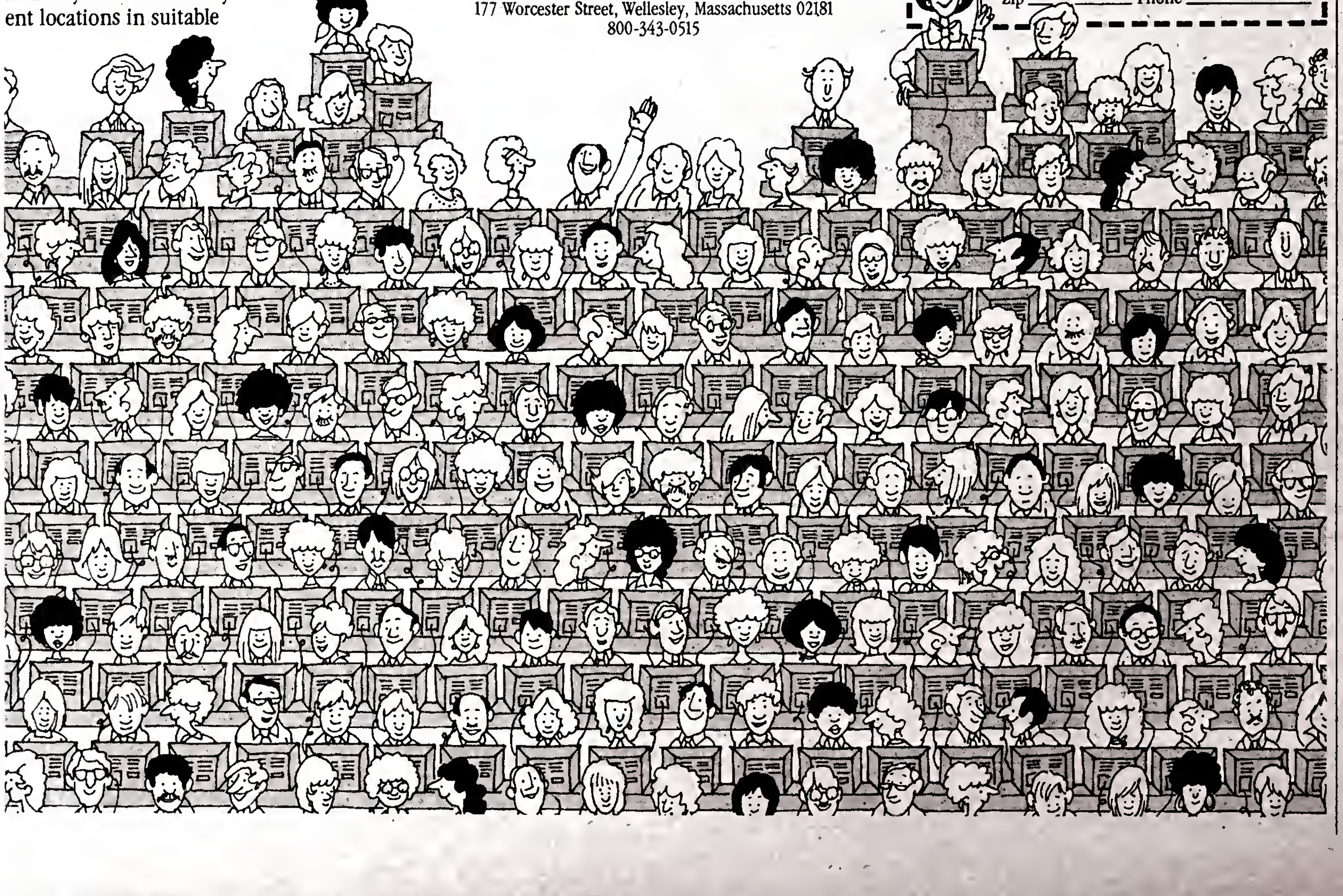
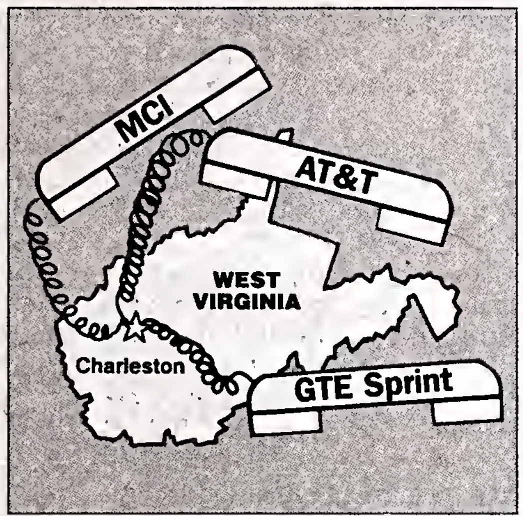


Carriers blitz Charleston in battle for customers

By Bryan Wilkins
CW Washington Bureau

CHARLESTON, W. Va. — Residents of this state capital are being treated to a wild and wonderful media blitz by eight long-distance telephone carriers. The eight are waging an all-out battle to sign up 34,000 business and residential telephone customers by July 15.

That is the effective date in Charleston of equal telephone access — the day on which Chesapeake and Potomac Telephone Co. of West Virginia, a divested Bell operating company, ends its dependence on AT&T and moves to a system that offers multiple carriers "equal access" to the exchange's telephone subscribers. The Charleston media blitz is likely to be repeated in 39 other major cities across the U.S. this year. As a result of the recent divestiture of AT&T, each telephone subscriber will have to pick the long-distance carrier he plans to use when equal-access facilities are in place. Chesapeake and Potomac will program its central office switch to reflect the first choice of the subscriber, who merely will have to dial "1," an area code and a phone number to place a long-distance call.



CW graphic by H. Fling

However, if the customer wants to use a second long-distance carrier, a dialing sequence that is five digits longer will be required. Consequently, the carriers see a distinct advantage to being designated a subscriber's primary carrier.

Here in Charleston, the competition has reached fever pitch. Carriers' radio, television and newspaper advertisements are providing a sudden windfall for local media owners, and telephone sales personnel have been hired by the droves.

Eight competing carriers

The eight carriers waging the battle for Charleston's local telephone subscribers — AT&T Communications; Satelco; Call U.S., Inc.; MCI Communications Corp.; Telamarketing Communications, Inc.; Satellite Business Systems, Inc.'s Skyline; GTE Corp.'s Sprint; and Long-Distance Telephone Savers, Inc. — are implementing new marketing strategies weekly.

In a surprise move earlier this month, MCI, the second largest carrier in the U.S. after AT&T, announced that on July 15 it will eliminate its initial and monthly subscription fee for all of its current customers nationwide in order to match similar moves by GTE Sprint.

AT&T recently announced it will give customers who sign with it 60 minutes of free long-distance calling. The move was promptly matched by MCI.

MCI adds 2,000 subscribers

"Charleston has become the New Hampshire primary of the telephone business," said MCI Chairman Bill McGowan. Since the advent of the campaign, MCI said, it has increased from 1,200 to 3,200 the number of subscribers that have designated MCI as their primary carrier.

According to the legal requirements for the switch to equal access, each divested Bell operating company will have to install at least one equal-access facility by September 1984. By September 1985, at least one-third of the access lines through the local telephone companies will have to be capable of offering equal access to carriers and customers. By September 1986, all exchanges in the U.S. will have to be switched to equal access.

Once the telephone customer designates which long-distance carrier is his primary carrier, he will be able to change to another carrier, but only upon payment of a fee.

In Charleston, Bell Atlantic, the regional holding company, will permit its customers to change carriers free of charge once during a nine-month period after the customers have been notified that equal access is available. After that nine-month period, however, it will cost $36.89 to designate a different primary carrier.

In Washington, D.C., where equal access will be available in parts of the city next September, the fee for changing carriers will be $41.09. In New Jersey, another Bell Atlantic service area, the changing fee is the lowest — $20.

The major work required by the seven regional holding companies to implement equal access is being done by their research arm, Bell Communications Research (BCR). Technically, equal-access requirements include comparable dialing sequences, equal access on rotary or push-button phones, transmission characteristics of equal quality, single dial-tone access and the automatic provision of answer supervision and billing information.

Future carriers the biggest problem

Robert Mercer, BCR assistant vice-president for network comparability planning, said the biggest difficulty with equal access was to "develop a scheme that allowed equal access to all companies that might get into the interexchange [long-distance] business."

This was solved by offering each carrier an access-code number, 10XXX, in which each X can be any number between 0 and 9. The XXX sequence will identify a particular carrier and eliminate the need to dial long strings of numbers to reach that carrier, Mercer said.

BCR systems engineers have developed software programs for the local telephone companies' central offices to recognize the particular carrier access codes, judge their validity and then route a call to the proper destination.

Another technical problem presented to BCR engineers involved the recognition of rotary telephone "clicks" in a digital format, which required a different set of software programs at the local switch to convert the signal to an appropriate form for routing.

Routing calls

Routing calls from different long-distance carriers required further software programming at the central office, where a call will now be routed directly to an interexchange switch, bypassing other local switch handoffs. The central offices will also have software supervision programs to ensure the completion of a call connection before billing occurs.

While the technical changes being made by Bell Atlantic add up to significant costs, the carriers themselves are spending like campaign candidates at election time.

MCI confirmed that it plans to spend at least $500,000 here on its local campaign, which emphasizes that MCI's long-distance rates are 40% lower than its major rival, AT&T Communications, which has an estimated 92% share of the long-distance market nationwide.

AT&T emphasizes tradition

AT&T Communications' campaign, using the faces of actors and TV personalities, emphasizes its long tradition of providing reliable service and such features as operator intercept and assistance, which the other carriers do not offer.

Large businesses with extensive communications requirements, ranging from massive data communications to multiple-voice calling, are the customers that the long-distance carriers are spending lots of time wooing.

However, large businesses have realized the need in recent years to employ experts familiar with long-distance tariffs and rates in order to keep their costs down. For example, Blue Cross/Blue Shield of West Virginia hired an outside consulting firm, Tele-Mark, Inc., to tell it what to do.

No new problems for business voice systems

Al Niderstrof, president of Tele-Mark in Fort Hill, Pa., said that adapting users' existing business voice systems for the new equal-access facilities of the local telephone company does not present new problems.

"Where the user already has in place an MCI or a Sprint capability, the dial '1' access will just make things easier," Niderstrof said. "Otherwise, it will just depend on the type of [private branch exchange] switch the organization already has in place."

'Charleston has become the New Hampshire primary of the telephone business' —
MCI Communications Corp.
Chairman Bill McGowan.

Niderstrof said that MCI's sales effort in Charleston "is having a heck of an impact," making people more aware that competition to AT&T exists. In the past, people were reluctant to switch to a competitive carrier because of the need to dial more digits, he said. Now, that will not be necessary, and the subscriber can take advantage of lower rates.

Most businesses already have in place facilities for multiple-carrier options and specialized lines such as foreign exchange and private line, in addition to Wats. Niderstrof predicted that business use of these services will increase as the dial "1" access capability spreads across the country and as businesses need to control increasing long-distance calls from their offices.

In the future, Niderstrof said, long-distance planning for business will depend on flexibility, such as that gained by making software changes, to reflect changing regulatory and tariff realities. "It is easier with the switches driven by software. . . . The user doesn't have to worry about what to do," he added.

Ford to purchase 70% interest in Starnet transmission service

DEARBORN, Mich. — Ford Motor Co. last week announced it will purchase a 70% interest in Starnet Corp., a three-year-old, San Diego-based long-distance telephone and data transmission service.

Presently, 80% of Starnet is owned by Greater Media, Inc., and 19% is owned by United Brands Co. Both reportedly will continue to hold equity interests in the company following Ford's purchase.

Ford said it will operate the company as a subsidiary of Ford Aerospace and Communications Corp. Starnet provides long-distance telephone service and data transmission, primarily using satellites, for 1,500 businesses nationwide.

Philip Caldwell, Ford chairman, said the company expects the long-distance telecommunications market to continue to expand rapidly. "The high-quality telecommunications services that Starnet provides to its clients, at attractive prices, will broaden Ford Aerospace's growing business base," Caldwell said.

The investment is another step in Ford's plan to diversify, he added.

Another of the Big Three automakers, General Motors Corp., was reported last week to be involved in discussions with Electronic Data Systems Corp. of Dallas about an acquisition or business association.

Tips offered on tying external data bases to info center

By Edward Warner
CW Staff

BOSTON — MIS managers who want to link their information centers with a dial-up data base should find a means to catalog the information in that data base for their users. And they should pay special attention to the means of communications used to download data from the external data base to their internal workstations.

Those observations, made by Samuel H. Solomon, vice-president for sales and marketing of Corporate Management Systems, Inc., were among several provided by industry representatives attending the mid-year management conference of the Information Industry Association here.

Solomon, whose credits include configuring the front-end computer support system for the investment banking firm now called Shearson Lehman/American Express, Inc., predicted a future in which dial-up data base information will be downloaded not to a corporate mainframe, but to the disk servers of a firm's local-area network, from which it can be accessed by the local-area network's workstations. In that way, he said, MIS managers will be freed from having to download the data continually from the mainframe to workstations themselves, and only those workstations that actually need the data will have access to it.

That may be very soon in coming, Solomon said, who added, "If I were an MIS manager, I would not want to spend my day downloading 2M to 3M bytes of [network data base] info to users."

Rapid change a problem

Other data base vendors at the conference said an additional problem confronting MIS managers considering an outside data base is that the data base industry is changing too rapidly and that standards, particularly in spreadsheet software and the use of microcomputers, have still not been set. Larry Day, senior vice-president of electronic publishing and industrial research at Business International Corp., said data base products are changing every week, and "I see nothing but absolute chaos for the next five years."

Solomon agreed and urged that the information industry — made up of data base publishers, on-line newsletters and videotex vendors — step back from following the quick-changing fashions of the marketplace and "let some opportunities pass." But another member of the roundtable panel at which Solomon and Day spoke warned that failure to follow market changes might mean "you just won't be here in five years."

Looking again to the future, Solomon predicted that MIS departments will integrate their firms' data with that coming into corporate information centers from outside data bases. Powerful economic calculations would then be possible, he said, adding that such thoughts are currently "real space-age" because of the internal politics that limit corporate departments from sharing data with each other.

An appropriate first step in this direction, he said, would be for a firm to index in its data dictionary the information to which it has access in outside data bases. Later, the data dictionary could be expanded to include in-house data sources as well, he said.

One firm that already has taken an information center approach to both its in-house and outside data bases is the Alabama conglomerate Blount, Inc., according to Peter Robinson, its vice-president for planning. Robinson established the firm's in-house information clearinghouse, where all executives have access to unclassified data on the company and each of its divisions, as well as the data that the firm gains via its outside data base providers, such as Dun and Bradstreet Corp.

The Blount information center, where most data resources can be accessed on-line, has since been expanded to include a Strategic Intelligence System, which offers day-to-day information on each of the firm's divisions. The information center's services are provided free to the company's managers.

Another executive who spoke at the conference, Donald McLagan, executive vice-president for client operations of Data Resources, Inc., noted that the personal computer arrived on the information industry scene just as time-sharing computer services were entering a down-sliding period, which he called their "creative destruction." Time-sharing, he said, had revolutionized data processing by providing interactive capability for users, and the arrival of the personal computer has continued that situation but disconnected the user from a time-sharing mainframe.

The effect, he said, has been to end the heyday of the "information guru" or strategic planner in the corporate information center and to put data base information directly in the hands of the manager at his workstation.

Data base providers told anti-hacking laws key to system security

By Edward Warner
CW Staff

BOSTON — The boom in personal computers — expected to number 10 million in the U.S. by 1985 — promises to "increase exponentially" the risk of damage to computer systems by hackers unless laws are enacted against them.

So said George Minot, Compuserve, Inc. vice-president, who spoke to a gathering of executives at the Information Industry Association's mid-year meeting here last week. Minot warned the executives, who represent data base providers and videotext vendors, that "unless this problem is addressed early on, this [information industry] will never reach its potential."

Hackers not only often steal data base services, but also tie up a system's limited number of ports, preventing bona fide customers from gaining access, Minot noted. Those customers may become disgruntled and abandon use of the data base, he warned.

Minot, who admitted that in one case hackers stole $1 million in Compuserve services in two days, called upon the information industry to establish greater system security, lobby for the passage of anti-hacker laws and promote greater public awareness of hacking as a crime.

He said that law enforcement officials should be consulted before rather than after an intrusion occurs, and that information service providers should post a "no trespassing notice" on the screens their systems display to users. Such a notice will give prosecutors the basis on which to prosecute a hacker, at least on trespass charges, he said.

Minot later turned the rostrum over to Jonathan M. Winer of the Massachusetts Lt. Gov.'s staff, who said that sometimes even a trespassing charge is not enough to bring a conviction against a hacker. "How can you trespass if you don't even go into the state?" Winer asked.

Stopping a hacker

Winer, the author of an anti-hacker bill now under consideration by the Massachusetts legislature, said the key to stopping the hacker is a law that bans both intentional access to a computer system by an unauthorized user and the larceny or damage to data that often arises.

The Massachusetts' anti-hacker bill does both, providing misdemeanor penalties of one year in jail and up to a $5,000 fine for intentional intrusions and felony status for data larcenies.

Minot said the anti-hacker bill is unlikely to pass this year, but will in 1985. He claimed that a roadblock to its passage is the information services industry itself, which he said fears speaking out about specific intrusions that have occurred on their systems. "I've been told of crimes in many parts of this state by [firms] who will not go public with it."

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Anheuser-Busch says no to micros, yes to info center

CW AT FUSE

By Paul Gillin
CW Staff

ORLANDO, Fla. — It is virtually impossible for employees to buy a microcomputer at Anheuser-Busch Companies, Inc. in St. Louis. The situation exists by choice.

"Anheuser-Busch tends to be a conservative company, and they're waiting for the technology to become more advanced," explained Rose Wiethop, systems analyst in the information center at Anheuser-Busch. "They're also waiting for a time when the [personal computer] will be able to kick back to the mainframe for a file or more memory without the user having to know sign-on procedures."

Speaking here last week at the eighth annual conference of Focus Users for System Enhancements (Fuse), the user group of Information Builders, Inc.'s Focus fourth-generation language and data base management system, Wiethop said that despite its strict micro policy, Anheuser-Busch has succeeded in largely satisfying end-user computing needs through a large information center. The center consists of IBM 3033N and 370/158AP mainframes running IBM's VM/CMS operating system on top of MVS and OS/VS1.

A variety of user-oriented software packages run on these processors. Among them are Focus; Comshare, Inc.'s System W; Iscco, Inc.'s Tell-a-Graf; SAS Institute, Inc.'s SAS Graph; and The Mega Group, Inc.'s Megacalc mainframe spreadsheet.

The information center processors also serve as a backup to the corporate data center in case of a disaster. Extracted data is regularly loaded into the information center for end-user access.

The center was installed principally to offer an alternative to micros and to challenge the growth rate of external time-sharing costs, Wiethop said. Since it was established in 1982, the user base has grown from 129 to 670. Its use in 1982 led to the first reduction in time-sharing costs, reversing a trend that had seen costs escalating at 32% per year.

Among the services provided for users by the information center staff are hot-line assistance, extensive training, consulting advice on the use of tools and methods, maintenance and support of software, data transfer between the two data centers, ordering and distribution of manuals and evaluation of software requests.

A staff of four supports the 670 users. Operations support is not provided, but is available as needed through the corporate data center.

Strict charge-back rules

The information center employs strict charge-back rules for CPU usage and programming assistance, although training and maintenance are provided free of charge. Still, Wiethop said, the information center rates are about 30% to 50% of the rates for time-sharing.

Focus has been a keystone to the use of the information center, she said. The concept took off immediately after Focus training was introduced in October 1982 and slowed when training was cut back earlier this year.

To use Focus, users must develop a good background in basic mainframe tools. They must first have an application in mind that needs to be developed. They must also take introductory classes in data processing, learn how to use the IBM 3270 terminal and be well versed in IBM's ISPF editor. In fact, users must turn in an ISPF assignment before they can start the Focus class, she said.

Anheuser-Busch has developed its own training course, but emphasizes that to be effective, users must employ the tools regularly. With Focus, for example, users are expected to practice on the system for at least 20 hours within two weeks after the training class.

Like many companies, Anheuser-Busch has not seen a reduction in its application backlog since the information center was established. However, the content of the backlog has changed, Wiethop said. Applications that were not deemed important enough to be placed on the waiting list in the past are now being written by users. As a result, the data processing staff is free to work on larger and more complex applications.

However, programmers do not usually take easily to the concept. "They believe you're trying to get rid of them," she said. To avoid problems, Wiethop recommended explaining that the purpose of the information center is to change their work to higher quality rather than high-quantity development.

"We have trained the entire application department in Focus, so if the user doesn't want to do a report, he can have it done there," she said. "This helps relieve the 'us vs. them' syndrome which we had at first."

Information Builders unveils upgraded version of Focus

CW AT FUSE

By Paul Gillin
CW Staff

ORLANDO, Fla. — At the eighth annual meeting of the independent Focus Users for System Enhancements (Fuse) organization here last week, Information Builders, Inc. announced an enhanced version of its Focus high-level language and data base management system. Focus Release 4.5 includes data base enhancements, improvements to the Fidel screen manager, language enhancements and new external interfaces.

A new Combine command allows relational updating of up to 16 separate Focus files within a single procedure, a spokesman said. Schema enhancements allow Defined expressions to be stored in Focus Master File Descriptions and accessed whenever the file is used.

Users can now designate whether missing data values are to be identified or defaulted. In addition, Modify procedures that include many IBM 3270 screens can now be compiled and saved for later execution. Binary tree indexing is now supported, offering greater efficiency for large data bases, the company claimed.

Enhancements to Focus's Fidel screen manager include support for 3270 screen attributes; dynamic attribute change on 3270 terminals; automatic forms creation, which is a facility for novice users that generates fully formatted Fidel screens listing all data base fields; and Automod, a menu-driven procedure that provides automatic application generation for relational Focus files.

Among the language enhancements is a facility to include master file descriptions of fixed-format sequential files in Fixform Modify procedures. This eliminates the need to list each field name individually and allows users to create subset Hold files with select field names for automatic loading into Modify procedures, the spokesman said.

Relational join facilities have been expanded to include full-scale joining of IBM IMS, Vsam, Isam and Qsam files to single-segment Focus files. Up to 16 data bases can be simultaneously joined together at report time, the spokesman said. Dynamic field formatting has been added, allowing the formats of data fields to be specified dynamically in Table requests.

New interfaces are now available for Software Arts, Inc.'s DIF (data interchange format), IBM's DL/1 data bases under the DOS operating system and Execucom Corp.'s IFPS decision support system. The DIF interface allows users to extract data from IBM's IMS, Cullinet Software, Inc.'s IDMS, Software AG of North America, Inc.'s Adabas and Isam, Vsam and Qsam files and download it into microcomputer-based packages using the DIF format.

The DOS/DL/1 interface is for users of IBM's CMS operating environment and is part of Information Builder's Cross-Machine Interface (XMI). The XMI interface allows Focus users under CMS to query DOS/DL/1 data bases allocated on other virtual or physical machines and to use those data bases in Focus relational join operations.

The IFPS interface lets IFPS users access data from Focus or non-Focus files and create Save files in IFPS.

A complete Focus basic system is priced at $66,000 and is available from Information Builders at 1250 Broadway, New York, N.Y. 10001.

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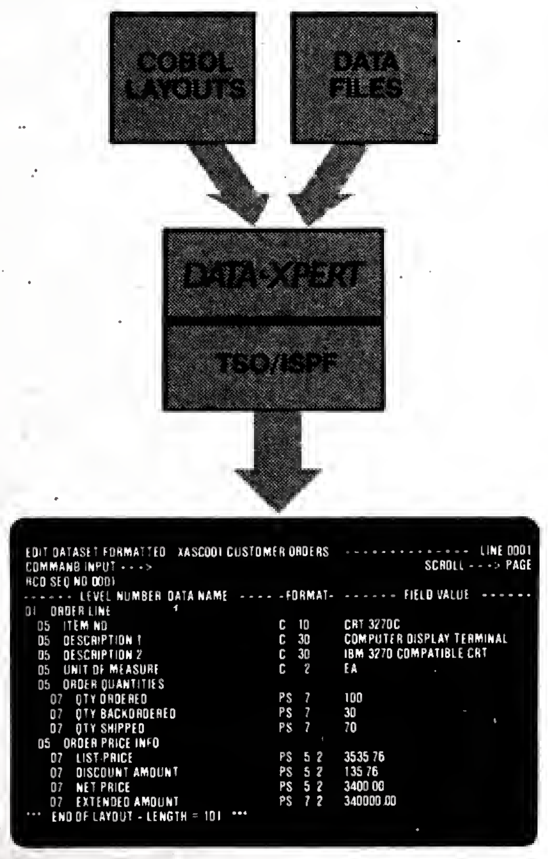

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  05   DESCRIPTION 1                 C  30     COMPUTER DISPLAY TERMINAL
  05   DESCRIPTION 2                 C  30     IBM 3270 COMPATIBLE CRT
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    07   NET PRICE                   PS  5 2   3400 00
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Attendance at Fuse meeting double that of last year

Organizational changes appear effective in encouraging participation

CW AT FUSE

By Paul Gillin
CW Staff

ORLANDO, Fla. — Even conference organizers had to admit they were surprised at the turnout last week for the eighth annual meeting of Focus Users for System Enhancements (Fuse), the users group of Information Builders, Inc.'s Focus fourth-generation language. The attendance of just under 1,000 was nearly double that of last year's meeting.

And while the balmy Florida weather and the conference's proximity to several tourist attractions undoubtedly played a part, recent changes at Fuse have been effective in encouraging participation, organizers said.

For one thing, Fuse this year eliminated the nominal membership fee it had previously charged. While the membership fee was only $100 per company, "it was unbelievably hard to get that money out of some companies," said Bill Sklar, a vice-president at Irving Trust Co. in New York and president of Fuse. "We felt that by raising the attendance fee a little, we could more than cover the lost revenues."

Fees for this year's conference came to $500 for vendors and nonmembers and $425 for members. Fuse expects to have about $50,000 left over after expenses. All of the proceeds will be plowed back into Fuse activities.

In 1983 the group took the step of incorporating and receiving tax-exempt status from the Internal Revenue Service. It also hired an employee to handle logistical work. These moves have allowed the group to establish itself more clearly as an independent entity and to foster more cooperation among the 16 regional users groups, Sklar explained.

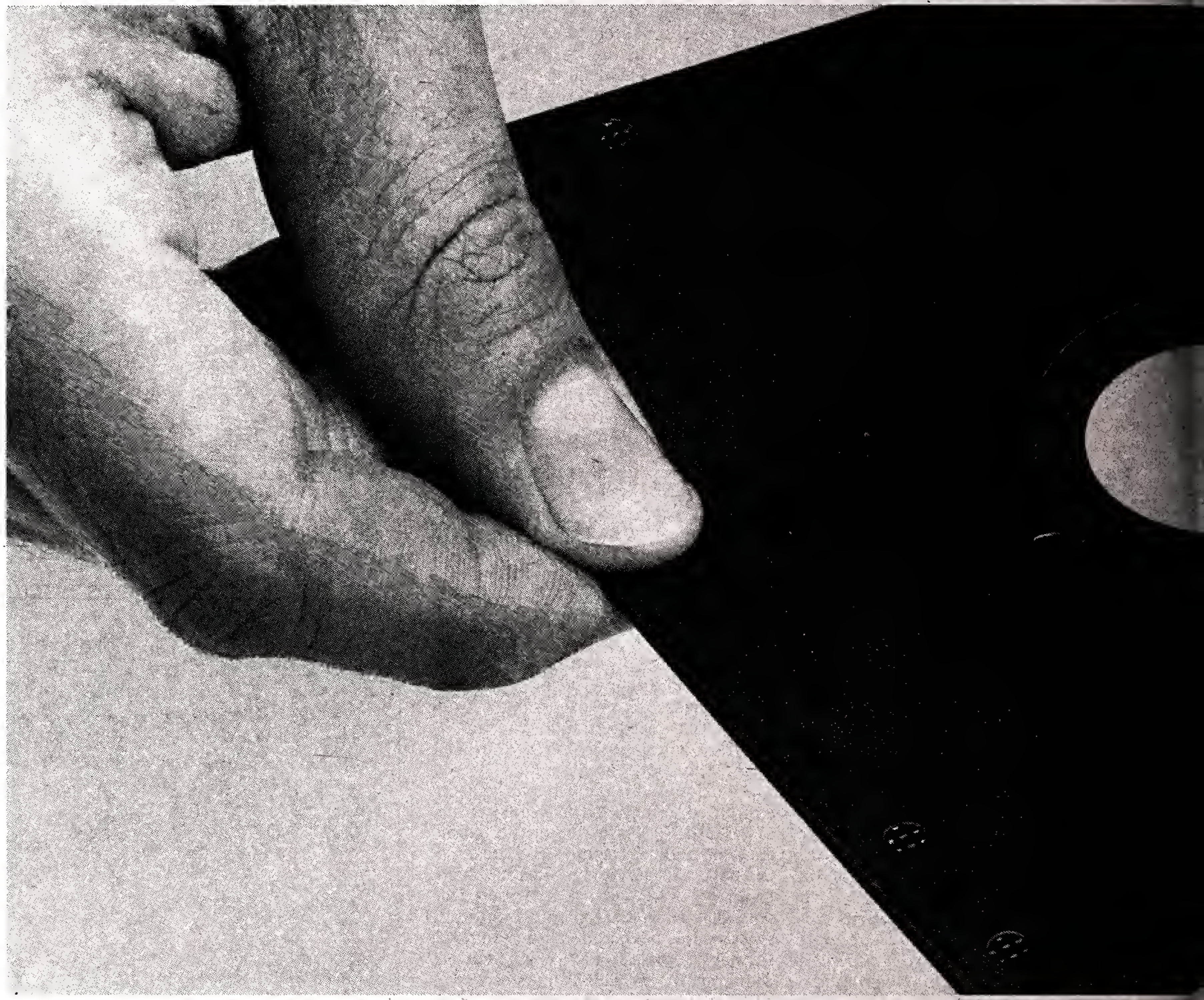
In addition to hosting the annual conference, Fuse publishes a newsletter and sponsors a technical coordination committee. The committee monitors Information Builders products, coordinates membership surveys and suggests enhancements.

The function of a users group should be "to form a single voice to let a company know what user concerns are," Sklar said. "A Fuse recommendation coming from thousands of ballots is not something [Information Builders] is going to take lightly." The voice is apparently being heard. An Information Builders spokeswoman said that, as a result of Fuse complaints about inadequate Focus documentation, the vendor added three full-time documentation writers in the last year.

In fact, Sklar said Fuse has had a major impact on the overall quality of Focus code. "While [Information Builders President] Gerry Cohen had been pushing new features in the past, we concentrated very much on the integrity of Focus code," he said. "As a result, Focus is a much more stable product than it used to be."

Although it is independent, Fuse cannot free itself from some reliance on Information Builders. The host company publicizes Fuse activities through its marketing literature and lends support for administration of the annual meetings. Information Builders also hosts a cocktail party at each conference.

In exchange, it gets 10 free registrations. However, Information Builders this year paid the full registration price for the additional 50 representatives it sent.



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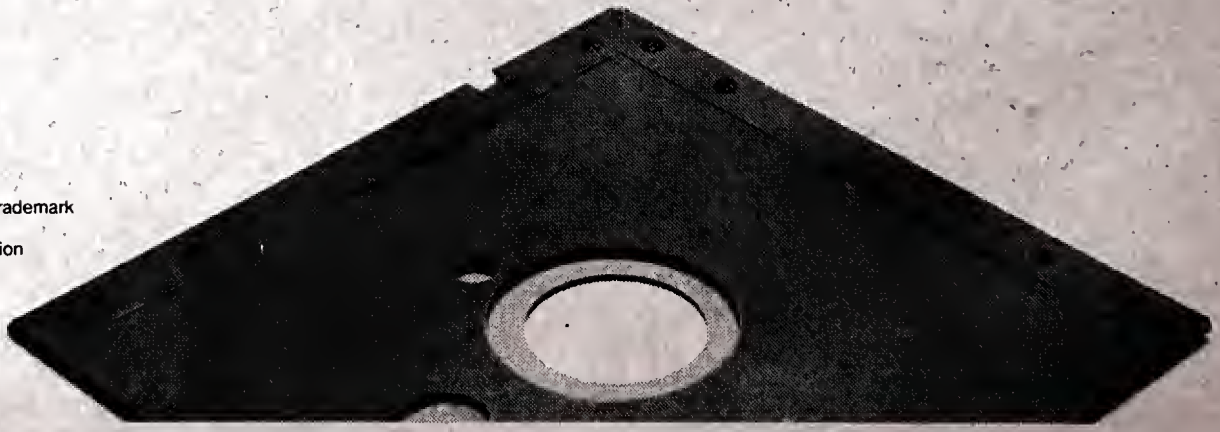

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Job worries seen stifling fourth-generation language use

CW AT FUSE

By Paul Gillin
CW Staff

ORLANDO, Fla. — Fourth-generation languages could be used far more extensively by professional programmers, but misperceptions and worries about job security are holding them back.

That was the consensus among users interviewed here last week at the eighth annual meeting of Focus Users for System Enhancements (Fuse), the independent users group of Information Builders, Inc.'s Focus fourth-generation language and data base management system.

Users unanimously reported that Focus and other productivity tools are underutilized by professional programmers, despite the users' assertions that prudent use of the technologies could reduce development times by 90% or more. In addition, they said, those programmers who do use productivity tools tend to be more visible and more popular with the end-user community.

But old habits die hard. "When someone has worked in a traditional language for many years, it's hard to get him into something new," said Steven Gilman, a consultant in business user services at Hughes Aircraft Co. in Long Beach, Calif.

Added Wallace Smith, vice-president of the BT Share group at Bankers Trust Co. in New York, "It's culture shock. Programmers think it's so easy to use that it's got to be for other people. People think real programmers have to develop in Cobol or assembler."

However, the users reported that use of productivity tools is generally on the rise among programmers at their companies. About 15% of the programmers at Hughes Aircraft are regular users of Focus, "and that seems to be accelerating," Gilman said. Smith said he is pleased that about 20% of the Bankers Trust programming staff now uses Focus.

The learning curve seems to be a major barrier in many companies, particularly among older programmers who are not accustomed to nonprocedural languages. "Programmers want to program in Focus just like they do in Cobol," said Stephen Morgan, a senior systems analyst at Gulf Canada Ltd. in Calgary, Alberta. "The structures just aren't the same. If you try to use IF-THEN statements in Focus, you're going to run into trouble."

As a result, programmers tend to run into Focus bugs more often, Morgan said, and the Focus documentation "is the worst part of the product." When programmers cannot find easy answers to their questions, they tend to give up, he said.

Users also admitted that some responsibility for programmer reluctance lies with the productivity tools themselves. The fact that software like Focus is more resource-consumptive flies in the face of the efficiency concerns that have always preoccupied professional programmers.

Gilman said, "Transaction-oriented systems are concerned about things like backup and data integrity, and these aren't always addressed in a fourth-generation language."

Many companies have also failed to realize that working with end users has become a more essential part of data processing. "In the past, a programmer's job was 70% DP and 30% business knowledge," said James Hoffman, systems project director in the petroleum products group at Phillips Petroleum Co. "I think those figures have now been switched."

Hoffman's staff of eight includes two Focus programmers and six maintenance programmers working pri-

See **WORRIES** page 16

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U.S. must see responsibility to Third World: IBI chief

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — U.S. government and corporate officials must recognize they have a moral responsibility for and a self-interest in the technological development of the Third World, the director general of the Intergovernmental Bureau for Informatics (IBI) said recently.

Prof. F. A. Bernasconi said failure of developing nations to keep pace with trends in information systems and services will mean economic disaster for the Third World, leading to political radicalization and lost markets for advanced nations. Bernasconi was interviewed by *Computerworld* when he was here recently to hold talks with U.S. State Department officials.

The Rome-based IBI, whose members are primarily Third World countries, but also include France, Spain, Italy and may soon include the U.K., is dedicated to promoting their access to and ability to use informatics, a term used broadly outside the U.S. to denote the entire range of systems and services related to information.

"Informatics has a lot of social, cultural, economic and political implications," Bernasconi said, explaining "it is not limited to information technology because every new development in informatics becomes a tool in another discipline," such as medicine, agriculture and government.

Informatics "is going to be the most important thing in our near future in the relationship between countries," Bernasconi said.

"Nobody has started to really seriously think about what is happening" in these technological relationships, according to Bernasconi. "It is in the self-interest of the developed countries to anticipate the problems that are coming and to find ways to promote the development of [Third World] countries," he said, noting the Third World financial crisis is causing those nations to fall further behind the developed world in the ability to use computer and telecommunications technologies.

He predicted that "in the next five to 10 years, there will be a critical situation in the developing world." As an example of the kind of problem arising, Bernasconi pointed to a trend of U.S. manufacturers that have stopped building plants in Third World countries.

With robotics, he said, "you don't need any more cheap labor, and it is more convenient to bring back your factory." He added that at the same time robotics drives down manufacturing costs, it will also cut the cost of raw materials, which are a staple of Third World economies.

This will add another serious blow to those countries and their work forces, which have begun anticipating better financial health because of technological development, according to Bernasconi.

"At the moment in which developing countries become poorer . . . you will find the radicalization of the rest of the world, and it will be against the interests of the U.S.," he asserted.

"It is a subject that someone has to think about and discuss," he continued. "I haven't the answer to the problem, but the question has to be considered. It is difficult, but it is more dangerous to just let things happen, and there is an ethical responsibility to make an effort to find out what to do.

"The U.S. is a big, powerful, advanced country, but it has . . . a big responsibility in the Third World in the same way a father has a responsibility for the whole clan."

He said the U.S. government and several major American companies, such as IBM, Control Data Corp. and Sperry Corp., have begun to show an interest in the activities of the IBI. But, he said, "it has started very, very slowly." He added the Soviet Union is at this point more active in the organization. However, neither country is a member of the IBI.

"It is fine to live in a nice country . . . but you also have to anticipate the problems that will result . . . if things do not develop in some harmony in the world," Bernasconi said, arguing that the U.S. needs new markets just as much as developing nations need technology.

WORRIES from page 15

marily in Cobol. The Focus programmers "tend to be more service-oriented," he said. "They take pride in being responsive to the user community and in seeing something produced in minutes."

Most users agreed that productivity tools are most popular with their younger staff members. "New users seem to have the easiest time because they don't have to relearn programming to use [tools like Focus]," Morgan said. But, he noted, the younger staff members are often not skilled enough to perform the detailed analysis that is often required of them.

"Focus is a single-user type of product, where one person does the analysis and coding," he said. "That's a real problem for the older programmers who know how to analyze, but aren't as comfortable using the language."

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Niosh officials still noncommittal in VDT safety debate

Congressional testimonies unlikely to mollify either side of the issue

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The National Institute for Occupational Safety and Health (Niosh) sits squarely in the middle of the debate over possible VDT health effects — a situation unlikely to change, according to the recent congressional testimony of several agency officials.

While not exactly fence-straddling, the officials indicated they are unwilling to come down on one side or another of the controversy until they complete additional studies of VDT use. One study, now in preparation, should yield the data necessary for a final opinion on whether VDTs cause reproductive problems; a study to test for possible adverse effects on vision is being considered.

String of 'Yes, but' remarks

The May 15 testimony of Niosh Director Dr. J. Donald Millar and two of his associates was a string of "Yes, but on the other hand" statements that are not likely to mollify either side of the debate. In quick succession, Millar told the Health and Safety Subcommittee of the House Committee on Education and Labor that:

■ "We do *not* find VDTs to be a source of dangerous radiation. Yes, there is some evidence that VDTs can increase both physical and emotional stress in workers."

■ "Although we do not see any physiological mechanism whereby VDTs could impair reproductive function, as yet we do not have the information to definitively rule out an effect of VDTs on reproduction."

■ Niosh laboratory findings "may suggest that the visual complaints of VDT operators represent discomfort, but have no more serious significance. Long-term studies have not yet been done, thus questions about the cumulative effects of visual strain due to [VDT] viewing remain unanswered."

Subcommittee Chairman Rep. Joseph M. Gaydos (D-Pa.), who has overseen a year-long investigation into this matter, spent an hour trying to extract a more definitive answer from the Niosh officials. Pressed on possible dangers from VDT chemicals, X-rays, gamma rays, ultraviolet light and static charges, Millar responded, "The answer to all this lies in a definitive research effort."

Zeroing in on possible radiation dangers — the most likely cause of reproduction and vision damage, if indeed VDTs are dangerous — Gaydos asked why additional study is necessary if previous studies have uniformly exonerated VDTs. "Are we spinning our wheels? Are we wasting our time? Is there one scintilla of evidence that we're talking about dangerous radiation?" he asked.

Millar told Gaydos that "we are not satisfied that we know what the effects of long-term, chronic use of VDTs are. . . . We are not satisfied with the currently available data."

Dr. Barry Johnson, director of Niosh's Division of Biomedical and Behavioral Sciences, told the subcommittee that government laboratory tests showed that VDTs under ultimate stress/failure conditions can cause X-ray emissions in excess of standards for television sets.

Gaydos asked if this meant an operator could have a dangerous instrument in front of him.

"It is not inconceivable that [this condition] could happen in the workplace," Johnson replied. But, he added, it is highly unlikely that such a machine failure would go unnoticed by the VDT operator. While a definitive ruling in the VDT safety debate awaits the outcome of the agency's long-term study, Millar said Niosh will continue to investigate complaints of VDT harm as agency resources permit. Although he is banking heavily on the three-year study, Millar also admitted that "there is an element of the unknown here. There may be some mysterious [aspect to the VDT problem] that we simply do not know about."

Niosh offers steps for easing VDT-related health ailments

WASHINGTON, D.C. — Periodic eye exams and regular work breaks for VDT operators are two of the basic steps organizations can take to ensure the comfort and health of their personnel, according to the National Institute for Occupational Health and Safety (Niosh).

Although Niosh knows of no scientific evidence pointing to permanent or serious health dangers from VDT use, the agency continues to study the issue. In the meantime, the agency is aware of the frequent VDT operator complaints of transient visual and musculoskeletal problems and stress, according to Niosh Director Dr. J. Donald Millar.

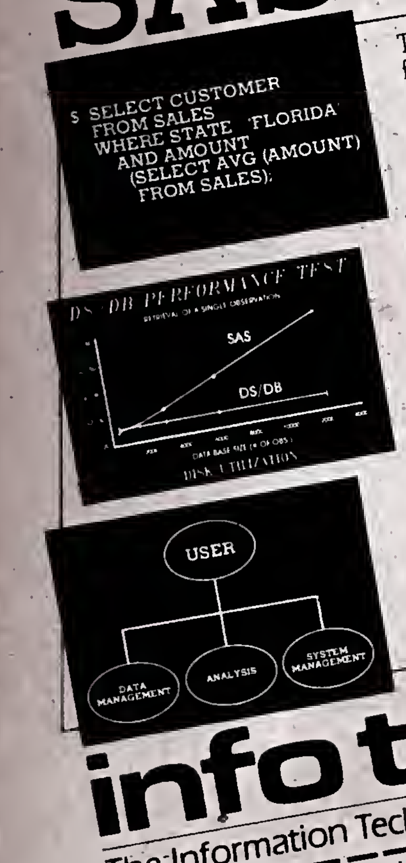
Recognizing "the state of knowledge regarding ergonomic, stress and radiation issues in VDT work," he said, the agency recommends the following "general guidelines, which may require modification in specific situations":

■ *Workstation design.* Maximum flexibility should be designed into VDT units, supporting tables and operator chairs. VDTs should have detachable keyboards, work tables should be height adjustable and chairs should be height adjustable and provide proper back support.

■ *Illumination.* Sources of glare should be controlled through VDT placement (i.e., parallel to windows as well as parallel to and between lights), proper lighting and the use of glare-control devices on the VDT screen surface. Illumination levels should be lower for VDT tasks requiring screen-intensive work and increased as the need to use hard copy increases.

■ *Work regimens.* Continuous work with VDTs should be interrupted periodically by rest breaks or other work activities that do not produce visual fatigue or muscular tension.

■ *Vision testing.* VDT workers should be given visual testing before beginning VDT work and periodically thereafter to ensure that they have adequately correct vision to handle such work.



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Consultants question computer's impact on workplace

CW AT ICCA

HOUSTON — The impact of computers on the workplace was called into question at the recently held annual meeting of the Independent Computer Consultants Association (ICCA) here, with representatives from the consulting and the vendor communities tackling the issue.

IBM's vice-president of marketing, F. G. Rodgers, labeled as a myth the charge that computers are causing worker alienation, a myth that can be dispelled with education.

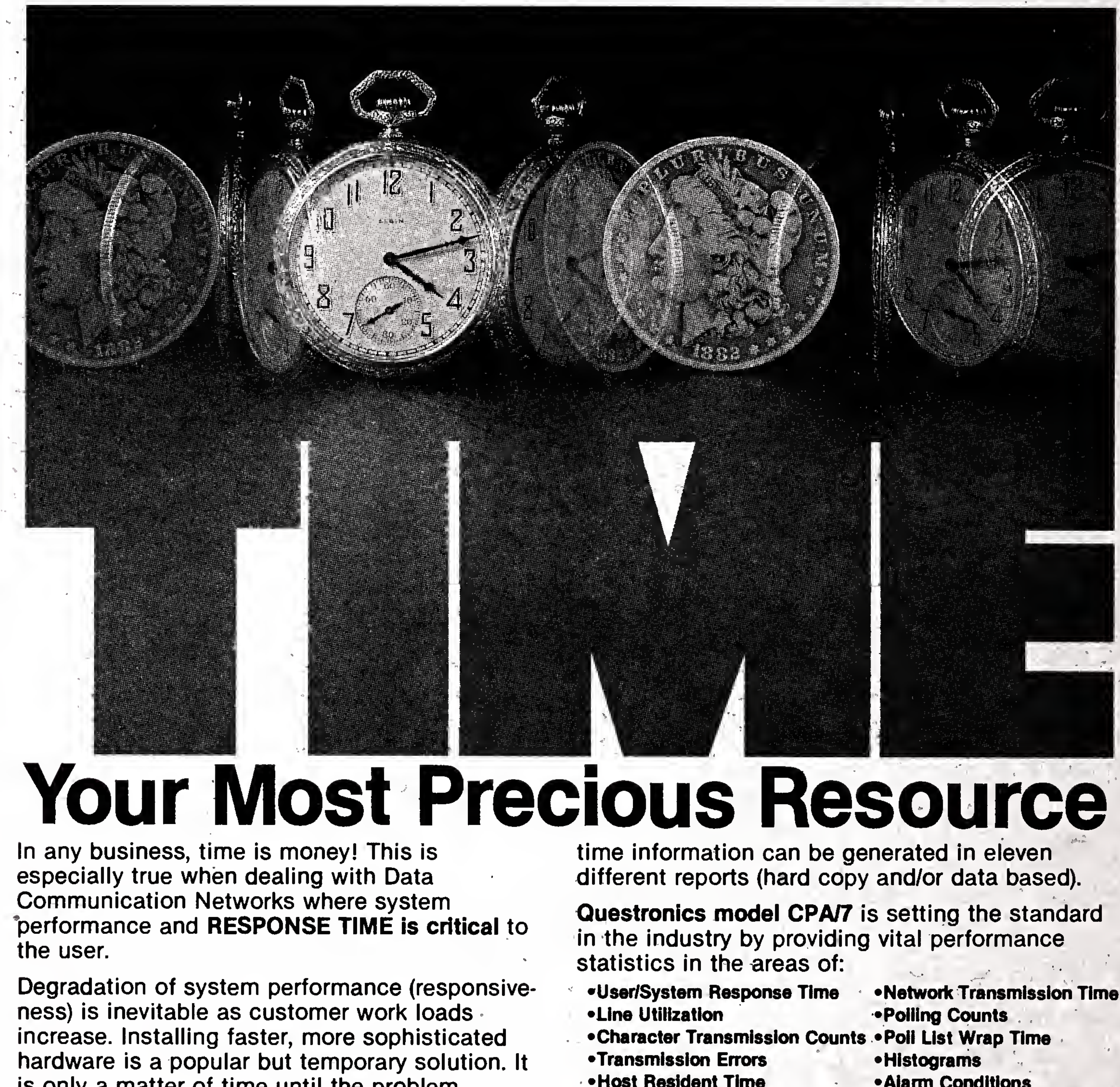
Jon E. Seidel, head of EDP Consulting, Inc. of Oakland, Calif., rebuffed Rodgers' view, claiming that his consulting experience has demonstrated the concerns of workers about the unknown impact of computers on job futures.

"It is a very, very significant issue. It is the issue of control, the ability of the machine to dictate the pace of work that the human does. I've seen very little appreciation of this point," Seidel said.

"I think we are going to be forced to deal with job displacement," Seidel continued. "The automation of the workplace means that the worker has to have higher and higher job skills, when in fact he can't find a job because he does not have the skill. Retraining is something that has to be faced," Seidel said.

Seidel said large vendors, like IBM, owe society the responsibility for easing the social dislocation that may be one side effect of introducing automation into the workplace.

IBM's Rodgers told the ICCA convention that the increased spread of technology through society is resulting in a "rising tide of knowledge seekers," who see technology as a means to acquire knowledge. Rodgers said these converts were more concerned about quality of life issues that older generations may see as a challenge to the work ethic. He said it is necessary to seek a balance between the two competing viewpoints, adding that IBM has a duty to pay civic rent or fulfill its social responsibility.



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Afcu meet to cover security

ROSSLYN, Va. — Security for federal government computers is the focus of the fifth annual Seminar on Security of Federal Automated Information Systems, which will be held on June 11-12 here at the Westpark Hotel.

Sponsored by the Association of Federal Computer Users (Afcu) Special Interest Group on ADP Security and Auditing and the graduate school, U.S. Department of Agriculture (USDA), the seminar will focus on protection of mainframe-to-microcomputer data. Topics will include keeping pace with changing technology, status of computer security legislation, changing management direction, upcoming changes to federal directives and new trends in audit techniques.

The registration fee is $125. More information is available from the Afcu Security Seminar, Graduate School, USDA, Career Planning and Development Programs, 600 Maryland Ave. S.W., Washington, D.C. 20024.

Mumps users set June 4 meet

PHILADELPHIA — The 13th annual conference of the Mumps users group will take place June 4-8 at the Adam's Mark Hotel here.

The conference will consist of presentations, tutorials, workshops and roundtable discussions focusing on issues involving the Mumps programming language. An exhibition of suppliers in the hardware, software and systems fields will be held in conjunction with the conference.

Registration for the full conference is $150, or $120 for Mumps users group members. One-day registration costs $70.

More information is available from the Mumps users group, Suite 308, 4321 Hartwick Road, College Park, Md. 20740.

Ethics of Big Eight involvement in DP services debated

Accounting firms' role in consulting business seen conflict of interest

CW AT ICCA

By Bryan Wilkins
CW Washington Bureau

HOUSTON — The Big Eight accounting firms, which perform most independent audits on U.S. corporations, have a booming computer systems consulting business going on the side, a business that independent consultants would like to stop.

At the annual Independent Computer Consultant Association (ICCA) meeting here May 17, a debate ensued over the ethics of the Big Eight's recommending computer installation and software management systems to clients while performing audits of the same companies.

The debate was not unlike the controversy that has for years smouldered within the ranks of the Association of Data Processing Service Organizations, Inc. (Adapso). The vendor organization has openly attacked the Big Eight's selling software and DP services to its audit clients, arguing such sales violate federal rules designed to ensure the independence of corporate audits.

The ICCA had invited a representative of a Big Eight accounting firm to a debate to be moderated by a U.S. Securities and Exchange Commission (SEC) official. However, the Big Eight spokesman did not show, even though he was scheduled to appear well in advance of the conference.

Ignoring the issue

"This is quite representative of the way the Big Eight accounting firms try to ignore the issue," exclaimed Walter Ulrich, ICCA conference chairman and president of Walter E. Ulrich Consulting of Houston. "They turn down every opportunity to debate it. And now this no-show is symptomatic of how they hope the issue will go away."

Edwin Tomko, assistant regional administrator of the SEC, said the computer consulting work by accounting firms was an important issue for the agency. "From our point of view, the independence of the accounting firm is the key issue. We are very concerned about the independence because we have to be able to determine what kind of work the firm has done," Tomko said.

Although there are no reliable statistics giving the revenues derived from computer systems consulting work by the Big Eight, Ulrich claimed that estimates showing over 25% of gross revenues of some Big Eight firms derived from this source are conservative.

"We have pretty reliable figures that show, for example, that [Arthur Andersen & Co.] — one of the Big Eight — is getting 22% to 25% of its revenues from nonaudit activities," Ulrich said, citing figures also used by Adapso in a series of briefs filed with the SEC last year.

Douglas Jerger, a former accountant with a Big Eight firm and now an independent consultant with Software Design Associates, Inc., said two principal issues are present in the controversy. One is the independence required by the accounting firm to conduct an accurate audit of a firm, and second, the issue of fairness and competition.

"We are just saying we don't want a disaster to happen when we can do something about it beforehand," Jerger said. He recommended that accounting firms be barred from the consulting business or at minimum be required to forgo audits of companies where they have performed computer consulting work.

Several ICCA members pointed to the recent contract awarded to Arthur Andersen to install an electronic data-gathering and retrieval-filing system for the SEC as an example of the potential conflict that can exist between consulting and auditing.

Since the SEC regularly screens the financial information filed by companies, the accounting firm with knowledge of the screening criteria would also be doing outside auditing work of firms that would be screened, observed the ICCA members.

The contract to Arthur Andersen to install a test automatic filing system is worth an estimated $8 million to $9 million over two years. The firm that lost on the bid to install the system at the SEC, Aspen Systems Corp. of Rockville, Md., earlier this month lodged a protest with the SEC alleging a potential conflict of interest on the part of Arthur Andersen.

SEC officals have been quoted as saying they reviewed the possibility of Arthur Andersen's conflict of interest between installing the system and conducting audits of firms that would use the system, concluding there was adequate separation between the two lines of business. No action has been taken by the SEC on the protest.

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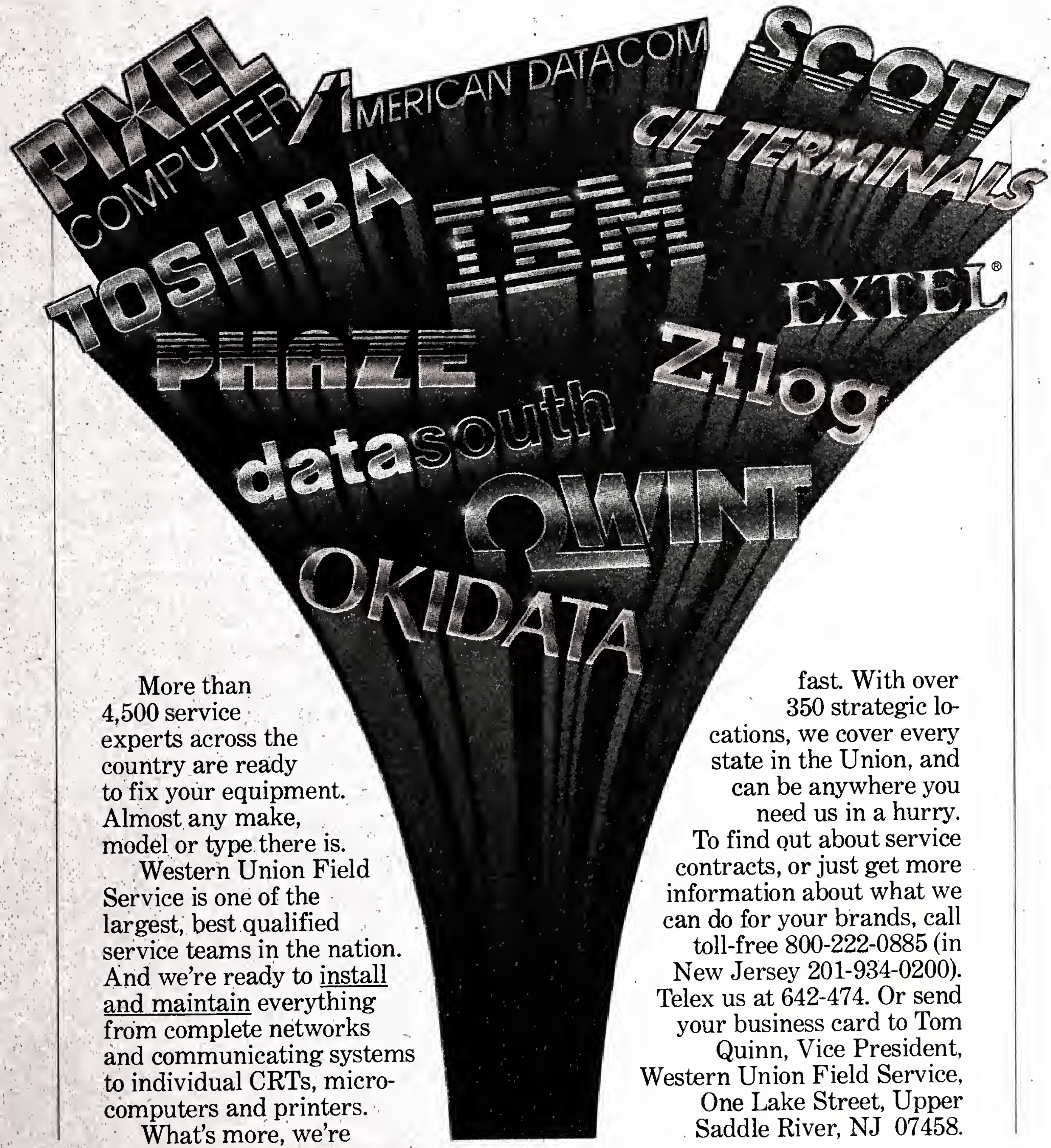

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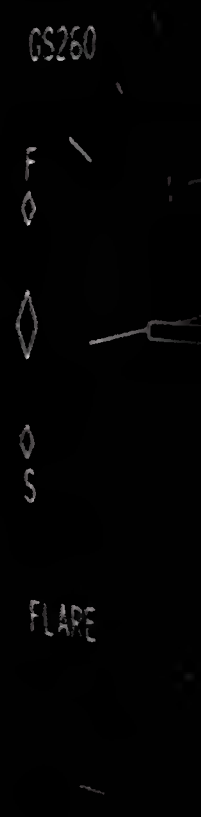

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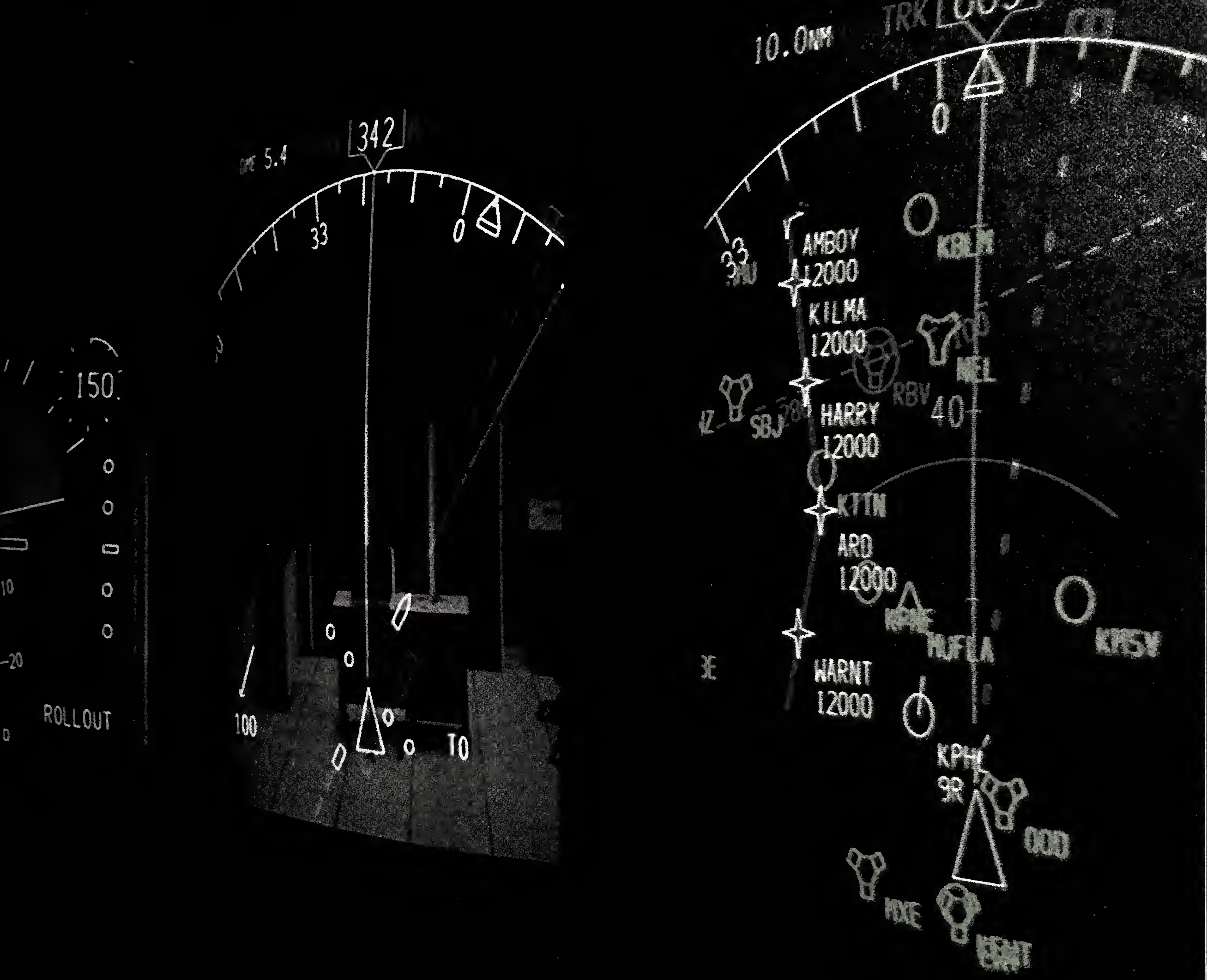

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Minneapolis approves controversial pact with SCT

Union argues city should hire permanent employees to restructure DP department

By Edward Warner
CW Staff

MINNEAPOLIS — The Minneapolis city council has unanimously approved a $1.1 million contract with Systems and Computer Technology Corp. (SCT) to provide the city's data processing department with needs analysis and training. The approval came despite the claims of one of the city government's unions that the contract would lock the city into a long-term and expensive arrangement with the firm.

The Minnesota Professional Employees Association (MPEA) had lodged its disapproval of the contract at a council committee meeting a week prior to the vote. The union said that although SCT was the low bidder, the city should hire permanent employees to restructure its data processing department.

The union also called the council committee's attention to a published report which told of complaints being leveled against SCT in connection with its contract with a Detroit-area community college. The complaints charged, among other things, that SCT had provided outdated software and inexperienced employees while carrying out its five-year contract to upgrade the Wayne County Community College computer system [CW, Jan. 30].

That contract, awarded in 1978 for $3.3 million, has since netted SCT $8 million, largely from contract extensions, according to news accounts. The extensions may have violated Michigan's competitive bidding process, a matter currently under investigation by the Michigan Department of Education, the *Detroit News* reported.

Minneapolis DP Director Stan Gabriel, asked by the council to review the union's claims against SCT, said he was aware of the Michigan investigation and yet felt reassured that "a lot of the claims against SCT were politically motivated." Gabriel said he talked with officials at "many sites" where SCT had performed services and found most of them satisfied with the firm's efforts.

Gabriel recommended to the council that the SCT bid be approved, and the council did so early this month. The firm, he said, had the "best qualifications for what we are looking for."

'Band-Aid approach?'

But MPEA union steward Ron Hildeen, one of 25 analyst/programmers in the city's data processing department, claimed that the city has "taken a Band-Aid approach" to solving the city's DP problems and said that the contract with SCT could be "renewed continually."

Gabriel admitted that the city isn't certain what is specifically wrong with its data processing department and that SCT's first task will be to conduct a study to determine where problems lie and how they can be corrected.

The results of that study, he said, "will be the deliverables" from the consulting firm. SCT will provide the department with a specialist in systems and programming, a senior analyst and two other workers whose responsibilities will be determined by the findings of the study.

Gabriel said the relatively low pay of the state's civil service system would have made it unable to recruit employees with the expertise needed to revamp the data processing department.

NCC attracts 650 exhibitors

LAS VEGAS — More than 650 companies plan to exhibit hardware, software, peripherals, accessories and publications at the National Computer Conference, which will be held July 9-12 at the Las Vegas Convention Center and Hilton Hotel.

The NCC '84 exhibition of existing products and developments will feature more than 20 product categories, said Russell K. Brown, conference chairman.

Exhibition hours are 10 a.m. to 5 p.m. on Monday, July 9, and 9 a.m. to 5 p.m. July 10-12.

Registration fees are $100 in advance or $125 on site for the full conference and exhibition, $40 for one day of the conference and exhibition and $35 for only the four-day exhibition.

NCC is sponsored by the American Federation of Information Processing Societies (Afips), Association for Computing Machinery, Data Processing Management Association, IEEE Computer Society and Society for Computer Simulation.

Further information on the conference can be obtained through NCC '84, Afips, 1899 Preston White Drive, Reston, Va. 22091.

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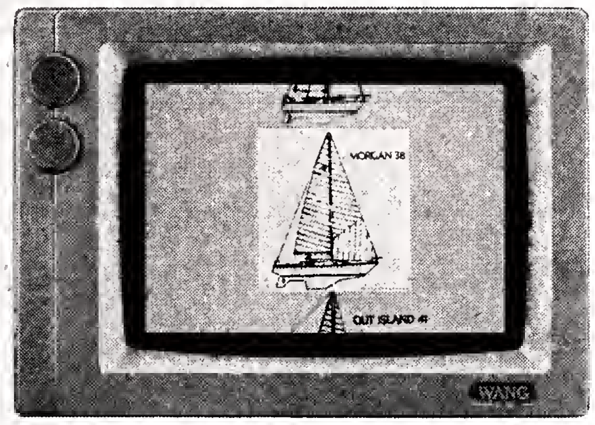

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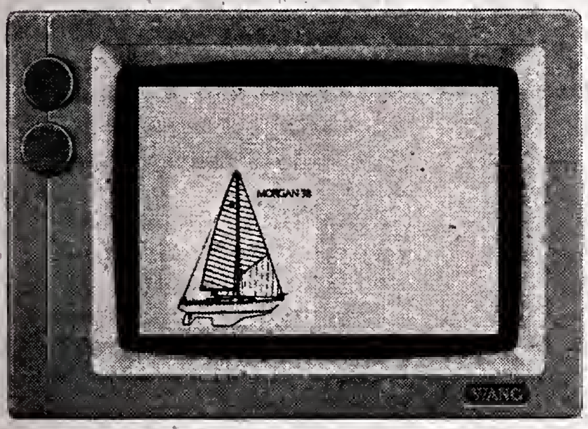

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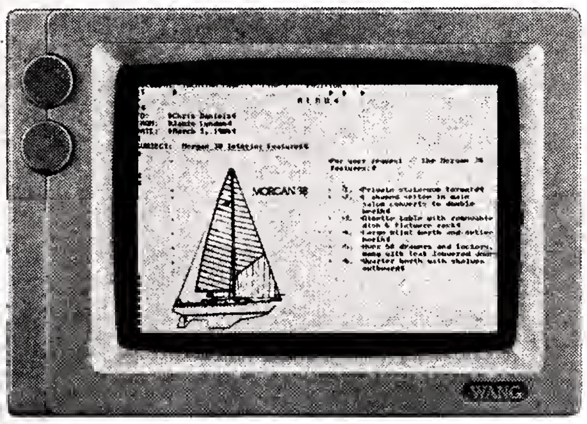
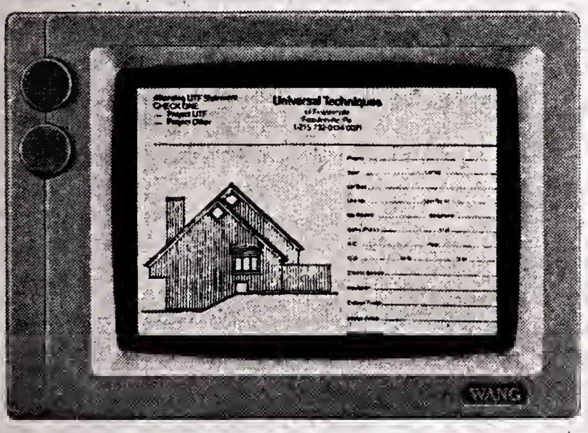


...and add text to create a new document, which can be printed or stored.



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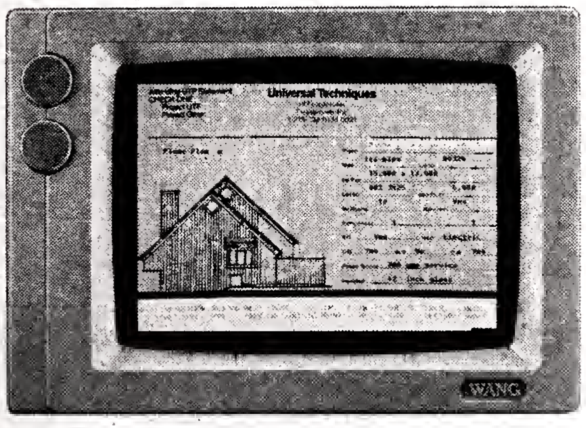
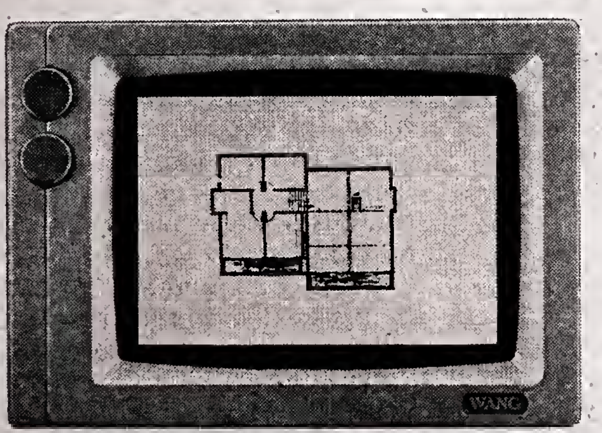
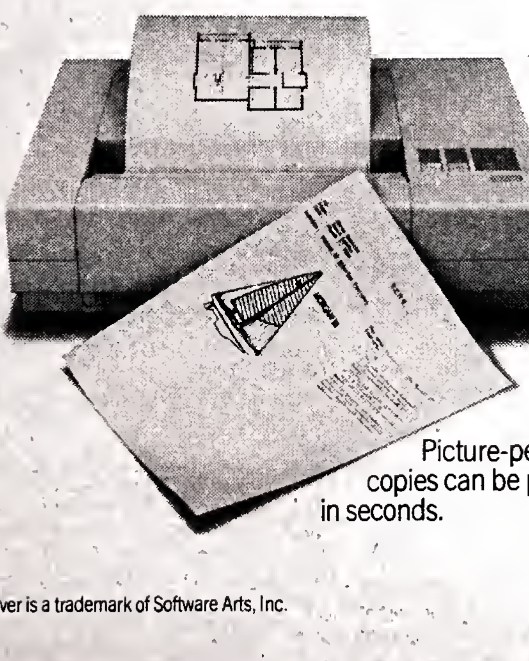


...and fill in the blanks and update your database. Use the cursor (under "floor plan")...



...to bring up other image or data files associated with the original document.



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Symposium attendees voice concerns about net standards

CAMBRIDGE, Mass. — Users attending the recent MIT symposium on networked computer systems here brought a number of concerns to the May 14 event, but many declined to bring them into the open.

Prof. Michael L. Dertouzos, director of MIT's laboratory for computer science and the chairman of the symposium, commented after a morning break that many controversial questions had been raised in the lobby following his broad overview of distributed applications network systems.

In a later interview, Dertouzos said that some users objected to his suggestion that network protocols be limited to one or two and operating systems be limited to one when plans are laid for a distributed applications network, in which many computers concentrate on one task. These users suggested such an approach was undemocratic.

Concern with standards

Two or three users interviewed by *Computerworld* shared a concern about standards. Robert Bareiss, director of process control technology for St. Regis Corp., a paper manufacturer, said he is concerned about standard protocols and operating systems because his company's efforts to get different manufacturers' equipment to work together have been difficult.

"We're buying [Digital Equipment Corp.]-compatible systems from different vendors to perform various functions and trying to get them to work together," Bareiss said. "The vendors are doing things for their own purposes and aren't necessarily interested in interconnecting. They make it our problem instead of theirs."

Kirk Birrell, a group leader in the engineering division of Eastman Kodak Co., said, "We're especially interested in standardizing protocol." A Management Automation Protocol developed by General Motors Corp. is a good standard for manufacturing, according to Birrell, who said it may be up to users to pressure vendors to standardize, but that such decisions should be left to technical people and not "politicians."

Alan Carr, a software engineer with Campbell Soup Co., which has over 50 plants in the U.S., said that Campbell is interested in a distributed network to be used for factory automation.

"We'd like to control processes on the factory floor and get data out for controlling and monitoring," Carr said. He is concerned about methods for authenticating and verifying commands sent between network nodes.

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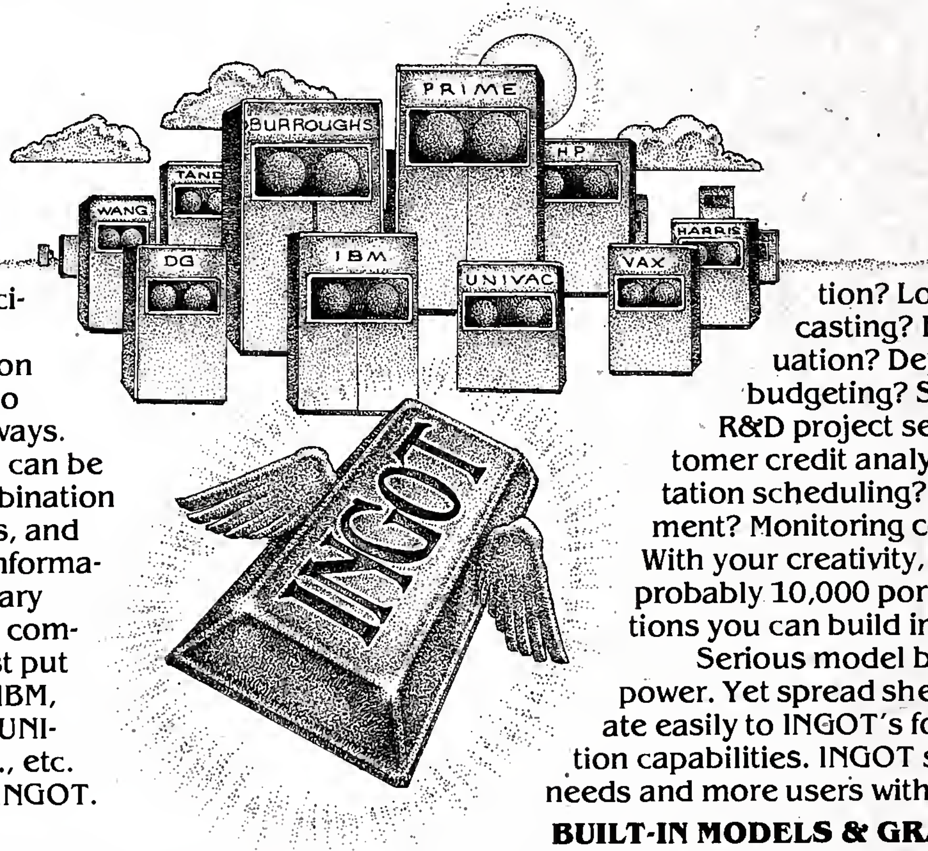

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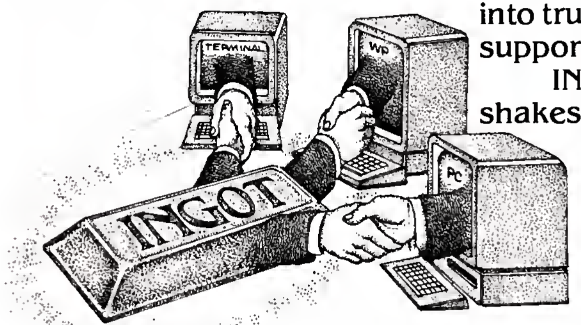

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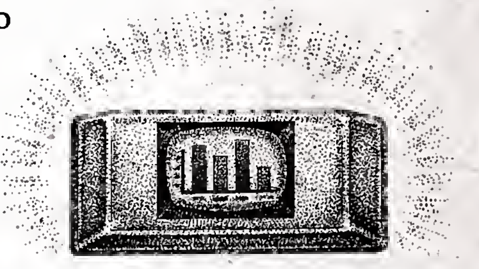

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ACM to discuss future trends

GAITHERSBURG, Md. — Current and future directions of computing are the focus of the 23rd Annual Technical Symposium of the Washington, D.C., chapter of the Association for Computing Machinery (ACM), to be held on June 28 at the National Bureau of Standards here.

The keynote speaker is Robert M. Worthy, vice-president of Government Information Systems Co., a subsidiary of Planning Research Corp. The featured speaker is Ed Yourdon, founder and chairman of Yourdon, Inc., a consulting firm.

Topics to be addressed include: understanding the software paradox; quality control model for software development and support; the role of computers in education; human factors in computing; software development using Ada; communications/networking; and optical disks.

Registration is $55 by June 1 for ACM members and $65 thereafter. Registration for nonmembers is $60 by June 1 and $70 thereafter. The cost for the proceedings only is $15.

More information on the symposium is available from Will Edwards, 4812 Iowa Avenue N.W, Washington, D.C. 20011.

Adapso to hold financial forum

NEW YORK — The Association of Data Processing Service Organizations, Inc. (Adapso) will conduct its 11th annual Computer Services and Software Industry Financial Forum on June 4 at the Waldorf Astoria Hotel here.

Peter Cunningham, president of Input, Inc., a market research firm, will present an Adapso report titled "The 18th Annual Survey of the Computer Services Industry."

During the forum, executives from more than a dozen computer companies will meet with members of the financial community to discuss recent earnings figures, marketing strategies and investment plans.

Registration costs $75 from Adapso, Suite 300, 1300 N. 17th St., Arlington, Va. 22209.

Speaker offers tips on distributed systems planning

By John Desmond
CW Staff

CAMBRIDGE, Mass. — At a recent symposium here on networked computer systems, Prof. Michael L. Dertouzos, director of MIT's Laboratory for Computer Science, outlined what not to do when beginning to plan a distributed system:

Don't go out and buy personal computers as a means of expanding a central system.

Don't spend all your time deciding the Ethernet-ring net question. Worry instead about what information will flow through the system.

Don't buy the "new, bigger, single machine that will solve all your problems."

Sharing advice he has given to the White House, MIT itself and two large banks, Dertouzos advised symposium attendees to "be city planners, not building architects."

Three-part plan

He recommended a three-part plan:

- First, decide on geographic distribution and needs of users for the next five to 10 years. This has been MIT's own approach in Project Athena, a five-year experiment in using hardware and software from Digital Equipment Corp. in a 3,000-workstation network.
- Second, estimate the number and location of local-area networks and determine which type of "spine" (twisted copper wire, coaxial cable or fiber optics) should connect the networks.
- Third, make the best current decisions about technology — but plan for the future.

Dertouzos recommended that as an initial goal, companies should choose a distributed system architecture that can arbitrarily scale up, perhaps to 10,000 users. To achieve reliability, he recommended the atomicity approach, which essentially acknowledges that either all or none of the contents of an atomic envelope were delivered, the envelope containing bits of information. This is what MIT is trying to achieve with its Argus protocol language, now in the development stage.

Moreover, Dertouzos advised, companies should settle on a small set of realistic standards, such as one or two network protocols and one operating language. (He said Unix is being used for Athena.)

Dissenting opinions

But the MIT staff is not unanimous in its support for such a limited number of standards. Dr. David Clark, of MIT's Laboratory for Computer Science, suggested it is unrealistic to project use of one or two protocols and one operating system. "Supporting multiple standards is the reality that will be forced on you," Clark said at the symposium.

Translation from protocol to protocol and operating system to operating system is another stumbling block to distributed applications systems, in Clark's view. "You know the saying, 'A little bit gets lost in translation?' Well, computers deal very poorly with a little bit being lost," he quipped.

Prof. Jerome H. Saltzer, who spoke on linking local-area networks, was even more pessimistic about translation. "It's practically hopeless to come up with a reasonable translation approach," he said. Specialized translators or "trusted intermediaries" are the best approach, he advised, citing banks and credit bureaus as present-day examples.

Dertouzos

Clark

CW photos by J. Desmond

Clark suggested that big battles loom in the struggle for open standards for protocol languages, needed so that translations can be written. While the U.S. Department of Defense's TCP/IP protocol and Xerox Corp.'s XNS protocol were published openly, many vendors refuse to publish their protocols, he noted.

Clark's vision of the future is that a few open protocol standards will dominate in three to five years; closed, or vendor-specific, protocols will persist because no company will give up a set of specifications to adopt one that it doesn't control; and multiprotocol machines will become common.

But Clark was pessimistic about the chances for opening protocol standards, saying companies will be reluctant to give up a perceived competitive edge, and the investment community may raise objections about a loss of control. Comparing the state of affairs to a current event, Clark said, "You really need a World Court, and the vendors will deny the World Court has any jurisdiction over them."

From Clark's point of view, the technology is here now to implement distributed application systems, but decisions to be made are "completely political at this point, almost totally nontechnical," and thus out of MIT's ballpark of developing technical solutions.

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TURNAROUND TIME

Larry Long

Q In March 1958 I began my first job in data processing. I've been addicted to computers and data processing ever since.

I've worked with the public sector since 1973. Several times during the past 10 years, I have made a determined and exhaustive effort to return to the private sector. May I assume that my voice is not the first you have heard commenting on the tragic misuse and disuse of talented people within the great federal bureaucracy?

With the excitement of technological change, I would like to be employed in a state-of-the-art installation. I currently work on an IBM 370/158. It has been a constant battle to overcome the catch-22 of "we would want you if you had such and such experience" (usually phrased in IBM alphabet soup).

I am not content with any job that fails to supply the proverbial litany of job satisfaction. While I am sufficiently pragmatic in my appreciation of a biweekly paycheck, I think you understand that intelligent people demand more. I am 59, single and free to relocate if the job is right. What advice would you offer me?

Your assumption is correct — I regularly receive mail from MIS professionals who express dissatisfaction with their plight as federal employees. Bureaucratic red tape, lack of coordinated planning, archaic policy on procurement and limited MIS career opportunities (to mention a few) are contributing factors that have stymied attempts by government computer installations to create a state-of-the-art environment. Although a few federal MIS departments are prospering, most are seven to 10 years behind in the implementation of state-of-the-art technology.

The competitive environment in the private sector does not permit companies that wish to stay in business to retain debilitating policies. The I-want-it-yesterday demands in the private sector have encouraged MIS managers to recruit people with skills that can immediately complement their environment. Unfortunately, this overlooks a great many capable government employees who have excellent skills, but lack critical acronyms on their resumes.

As for your particular situation, your best bet may be a small company that is willing to provide challenge and opportunity on a short term, but with no long-term commitment. I would also suggest that you apply for analyst positions in user departments. Just about every functional area manager in the country is either thinking about or actively recruiting computer types.

Q Our task group has been assigned the responsibility of writing a proposal for the acquisition of up to 20 microcomputers and two, perhaps three, minicomputers at our research and development facility. What seemed to be a simple task became difficult when we tried to describe the distinguishing characteristics of micros and minis. Perhaps you could help us?

A microcomputer is any computer that you can pick up and carry, and a minicomputer is a computer just larger than a micro. Is that technical enough? Does anybody else have a better technical description? If so, I will gladly print it.

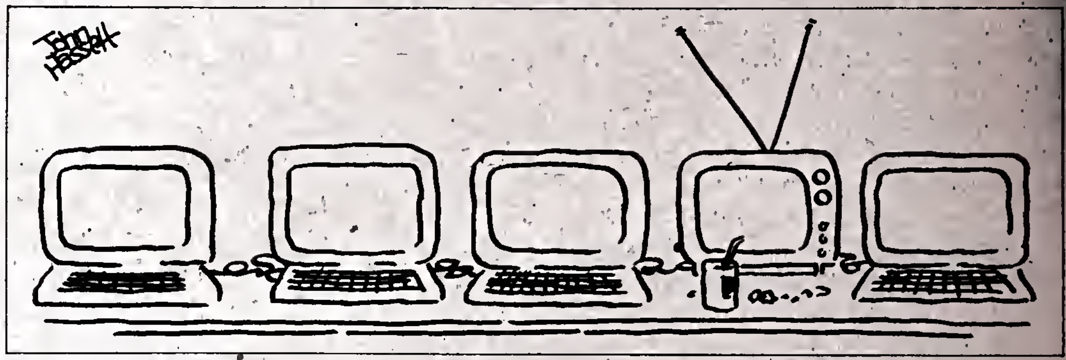
Q I am a technical recruiter and would like to know a great deal more than I do about operating systems in general and IBM operating systems in particular. I'm not interested in learning to program in a high-level language, although this seems to be the course of study most people follow. What course of study would you suggest for me?

Beginning your computer education with operating systems is akin to starting with the backhand, topspin lob when learning to play tennis. If you have not already done so, take an introductory survey course on computers and information processing at a local college. This will provide you with a general understanding of operating systems and how they fit into the scheme of things.

Your job function does not require an in-depth knowledge of operating system alternatives. However, I would suggest that you compile a matrix that lists IBM mainframes on the left and operating systems on the top. Invite a veteran IBM systems programmer client to dinner and ask him to fill in the column headings with common IBM operating systems (with the least sophisticated on the left) and to complete the matrix.

Then ask for a brief description of the computing environment best suited for each operating system. Of course, take copious notes. Update the matrix annually.

Long, president of Long and Associates, is a consultant, lecturer and author in the field of information services. If you have a question you'd like him to address, send it to Larry Long, Editorial Department, Computerworld, P.O. Box 880, Framingham, Mass. 01701.



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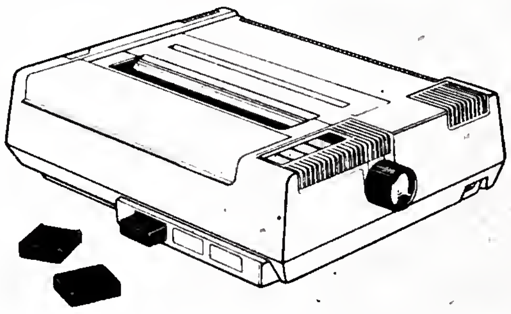

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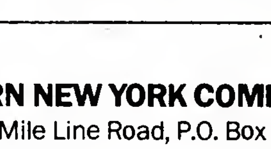

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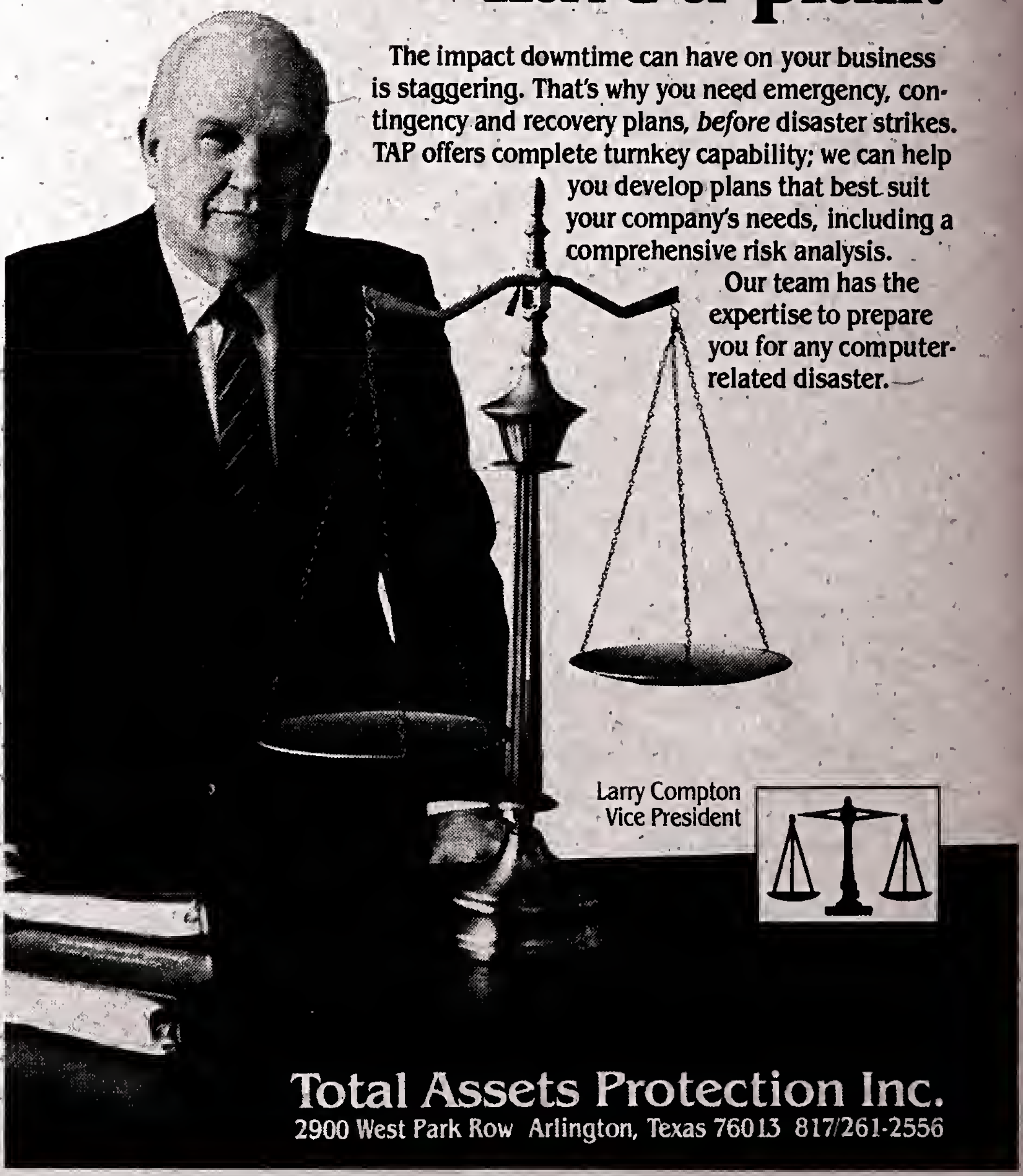

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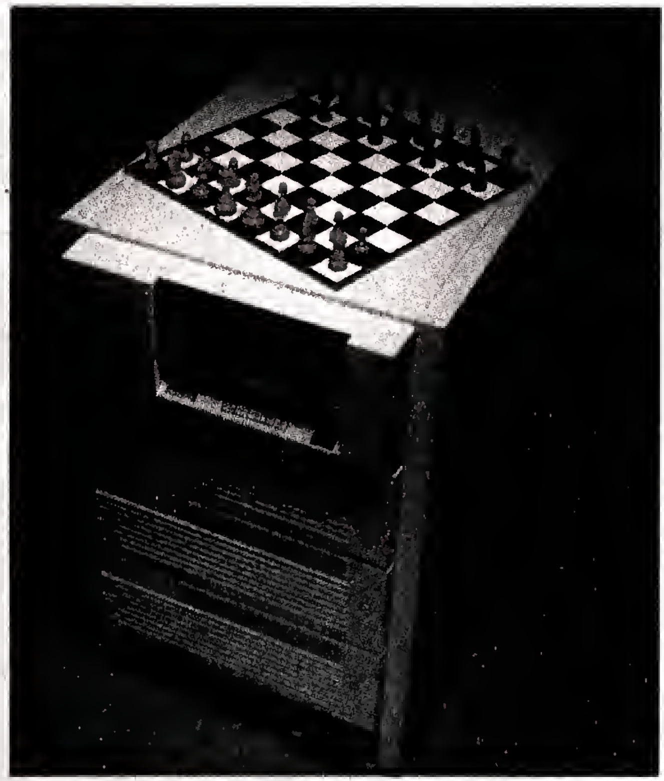

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Evaluate systems security immediately, bankers told

By Peter Bartolik
CW Staff

BOSTON — Banks are not likely to find any respite from the pace of technological advancements, so top executives should take immediate steps to evaluate and implement computer security procedures, a data security consultant and criminologist recently told bankers here.

Dr. Sanford Sherizan, president of Data Security Systems, Inc. of Natick, Mass., and a faculty member of Northeastern University's College of Criminal Justice, placed responsibility for data security at the level of the chief executive officer during his remarks before a forum session of the American Institute of Banking at Boston.

"Security is no longer an option," Sherizan told the bankers. He noted that mechanisms and products for data security are available, but require a commitment by executives to security. "Computer crime is to a large degree preventable, but it requires the involvement of top management."

Data entry workers with limited skills and limited supervision pose one potential threat to security, and providing customers with "user-friendly" interfaces to computerized equipment can make data "very friendly with the wrong users," Sherizan said. "Today's bank robber has traded in the tommy gun for the terminal and uses software instead of a sledgehammer."

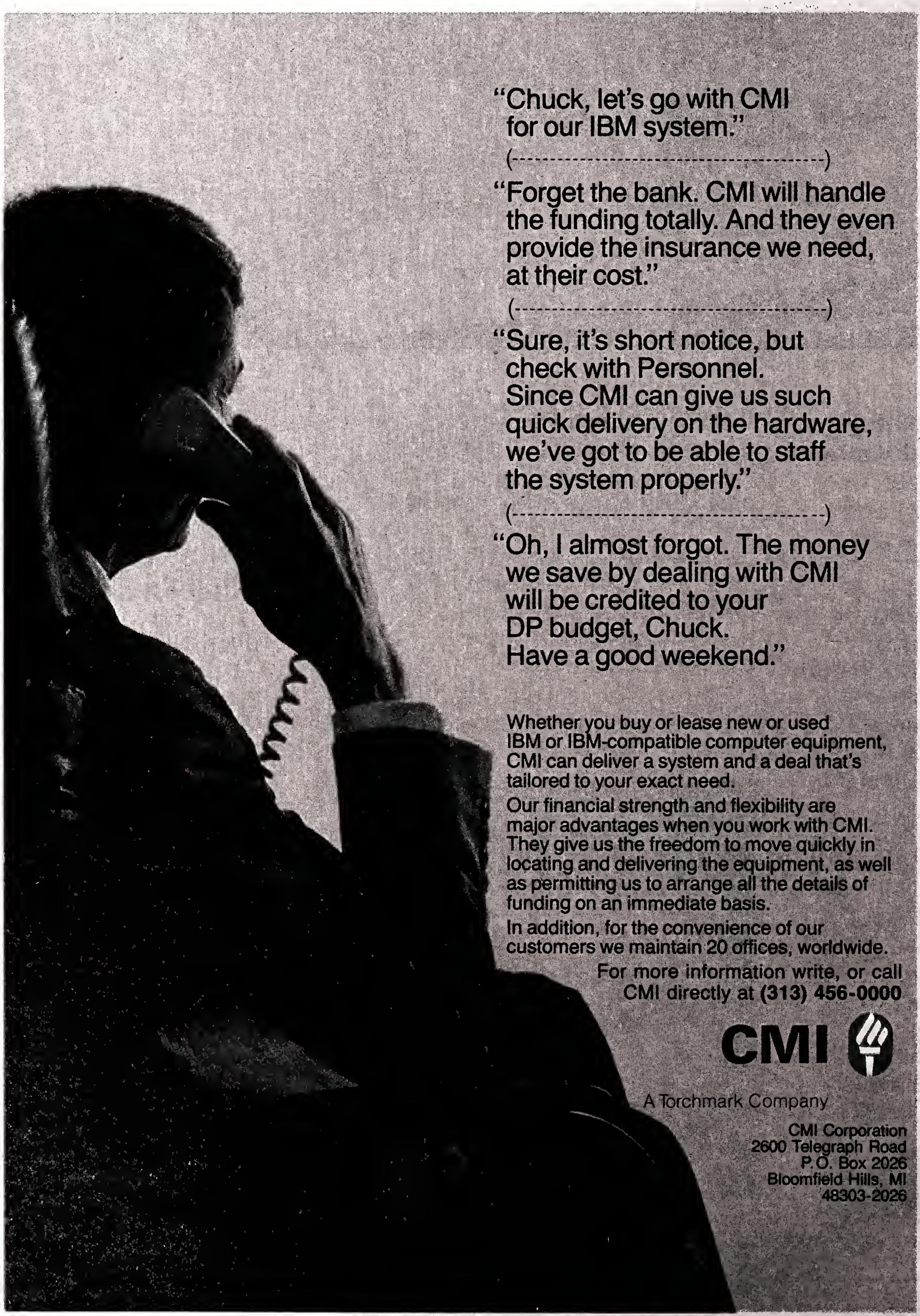
The key to adequate security, he declared, is to use the existing organization for security purposes. That requires a top executive to be "an active supporter, an active facilitator and an active supervisor" of security policies and procedures.

Sherizan maintained top management should determine what is being done about computer and electronic security; what should be done about security; and what can be done given a firm's resources.

Following that, management can then determine whether the firm has an effective security policy; how secure the computer system is; what are the most vital assets to be protected; whether employees always adhere to the security policy; and whether security personnel have direct contact with top management levels.

Sherizan declared that "unless security policies and procedures are written, tested and implemented, they are going to be worthless."

"Today's bank robber has traded in the tommy gun for the terminal and uses software instead of a sledgehammer." —
Dr. Sanford Sherizan, president, Data Security Systems



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Study reveals duty of securing computer data shirked

Responses from Dayton survey may be indicative of national attitude

By Robert Batt
CW West Coast Bureau

DAYTON, Ohio — If a recently completed study of local firms is indicative of the nation at large, most companies suffer from the "who's in charge here?" syndrome when it comes to responsibility for securing vital computer information.

Wright State University's Center for Industrial and Consumer Studies here found that at 15% of 204 companies interviewed in the Dayton area, no one is in charge of securing data. Ten percent of the study's respondents identified the chief executive or chief financial officer as the person responsible, while only 8% claimed the data processing director had chief responsibility for computer media security.

Of the remaining firms surveyed, responsibility for computer records was spread thinly across many different people and departments, including treasurers, controllers, operations departments, records and administration divisions and even mail room workers and secretaries.

"The survey was conducted by telephone, and our aim was to interview the person responsible for the security of computer-related systems. In many cases, however, we had a great deal of difficulty simply finding out who we should talk to," commented Tom Dovel, associate professor of marketing and the person responsible for conducting the study.

According to Dovel, the 204 companies interviewed represent a cross section of standard industrial corporations throughout the U.S., ranging from small businesses to Fortune 500 companies. For these companies, natural disasters are a major concern when it comes to securing computer media, with around 20% of the respondents saying this is their chief worry. A further 14% expressed a fear of corporate sabotage, while 11% said the computer hacker worries them the most.

Commissioned by Secured Data Services, Inc., an Ohio-based firm specializing in the off-site storage of computer data, the study found that 97.5% of the computer specialists interviewed stored their data base on-site. At the same time, 93% of the companies interviewed expressed concern about the

See **SECURITY** page 30

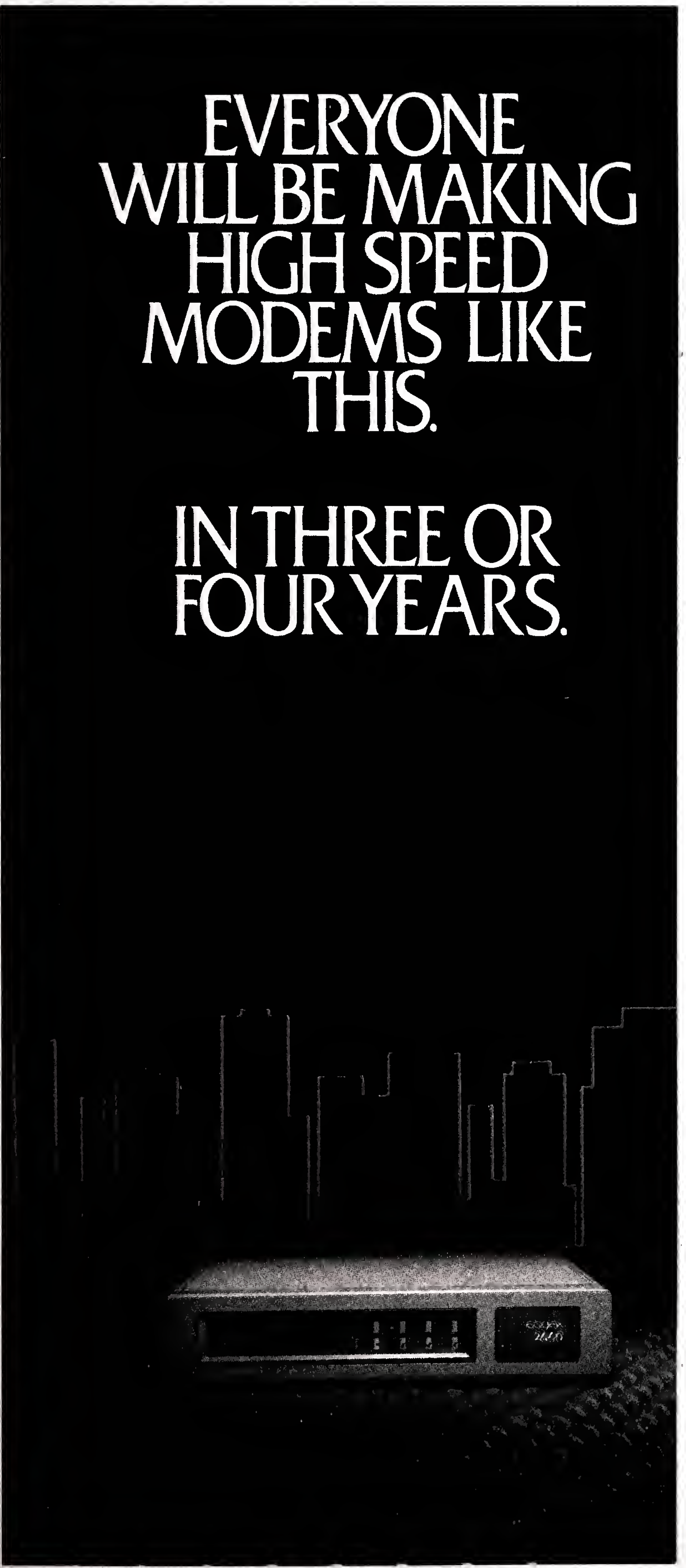
IACSS adds new grade

DIX HILLS, N.Y. — The International Association for Computer Systems Security, Inc. (IACSS) has announced the creation of an associate grade of its computer systems security professional certificate.

The associate grade will be granted to individuals working in the computer security field who have not completed the experience and education requirements for senior certification. They must pass an examination testing their knowledge of computer system security fundamentals, said Robert J. Wilk, president of IACSS.

Wilk said senior certification is based on a combination of work and educational experience and passing a four-hour written examination, in addition to the associate examination.

Application and examination fees are $125 for the associate grade and $175 for the senior grade. More information is available from the Certification Council, IACSS, 6 Swarthmore Lane, Dix Hills, N.Y. 11746.



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Speaker recommends off-the-shelf software for banks

By James Connolly
CW Staff

WASHINGTON, D.C. — Cost, documentation, availability and dependability are among the advantages that off-the-shelf microcomputer software offers when banks face the "buy or build?" decision, the American Bankers Association's National Operations and Automation Conference was told recently.

Banks and other companies should look first at commercially produced packages rather than deciding immediately upon in-house software development, said John E. Skrypa, manager of the Corporate Access Development Corporate System for Chase Manhattan Bank NA.

But while off-the-shelf software may be best for stand-alone microcomputer applications, there remains a shortage of programs that link micros to mainframes, according to Skrypa.

He listed some of the assets and drawbacks involved in various off-the-shelf packages. He noted that those packages simple enough to interest executives may not be versatile enough for executive use, and flexible packages may be too complex for the nontechnical user.

But he reported that front-end systems, which simplify complicated electronic spreadsheets and other programs, are becoming increasingly available.

He also cited the value of being able to use an off-the-shelf program the afternoon it is purchased, while in-house programs may not be used for several months.

Another advantage of a packaged program, he said, is cost. "Purchasing it will be cheaper, even at a cost of $6,000 for a single copy."

Skrypa advised the bankers to look first within their companies, whether for increasingly popular in-house computer stores or for advice from coworkers who may already be using the desired software. Other sources for advice on software packages include hardware vendors, software directories and independent software vendors' advertisements in magazines.

Try off-the-shelf programs

"I recommend that, at first, you at least try to buy off-the-shelf software. Even if you don't find what you need, you might come up with ideas that will help you in developing a program," he said.

In-house programs are expensive, take time to develop, often need extensive debugging and may have inadequate documentation, Skrypa said.

Rather than writing programs from scratch — whether using in-house programmers or consultants — banks might consider modifying off-the-shelf programs to meet their needs, he added. But he warned that buyers may find that some programs can't be modified if they are sold without source code. He singled out spreadsheets as being particularly useful when modified for special needs.

Skrypa observed that a shortage of development tools, such as application generators for microcomputers, is another negative factor in a decision to build a program.

SECURITY from page 29

storage of their data.

But the study also found a reluctance to place vital computer information off-site, with only 29% of the companies using backup tapes or storing their backup in an off-site facility.

In answer to another question, the study found that while 65% of the respondents regard off-site storage as a solution to their security needs, over 160 of the 204 companies store most of their irreplaceable data at their main DP location.

"The study seems to indicate that many companies are largely ignoring the fragile nature of their computer media. They don't know who's in charge, and so the responsibilities that must follow, such as storage, providing backups [and so forth], are being largely ignored," said James Valentine, president of Secured Data Services. "This is a dangerous situation, considering the fragile nature of computer media when exposed to such things as fire, smoke or water damage."

Commenting on the study's findings, John Porter, a member of the Association of Records Managers and Administrators, Inc., said he was not surprised by the figures. The problem, he asserted, is that responsibility for the security of computer data often rests with three separate parties — the DP department, records and administration staffs and the owner of the data.

Porter, who is manager of records and information management at IBM, said that while the owner has the ultimate responsibility, records managers should play a stronger support role in securing data stored on computer media.

"Currently, too many records administrators do not recognize that computer media is just as important as paper in the storing of vital information," he said.

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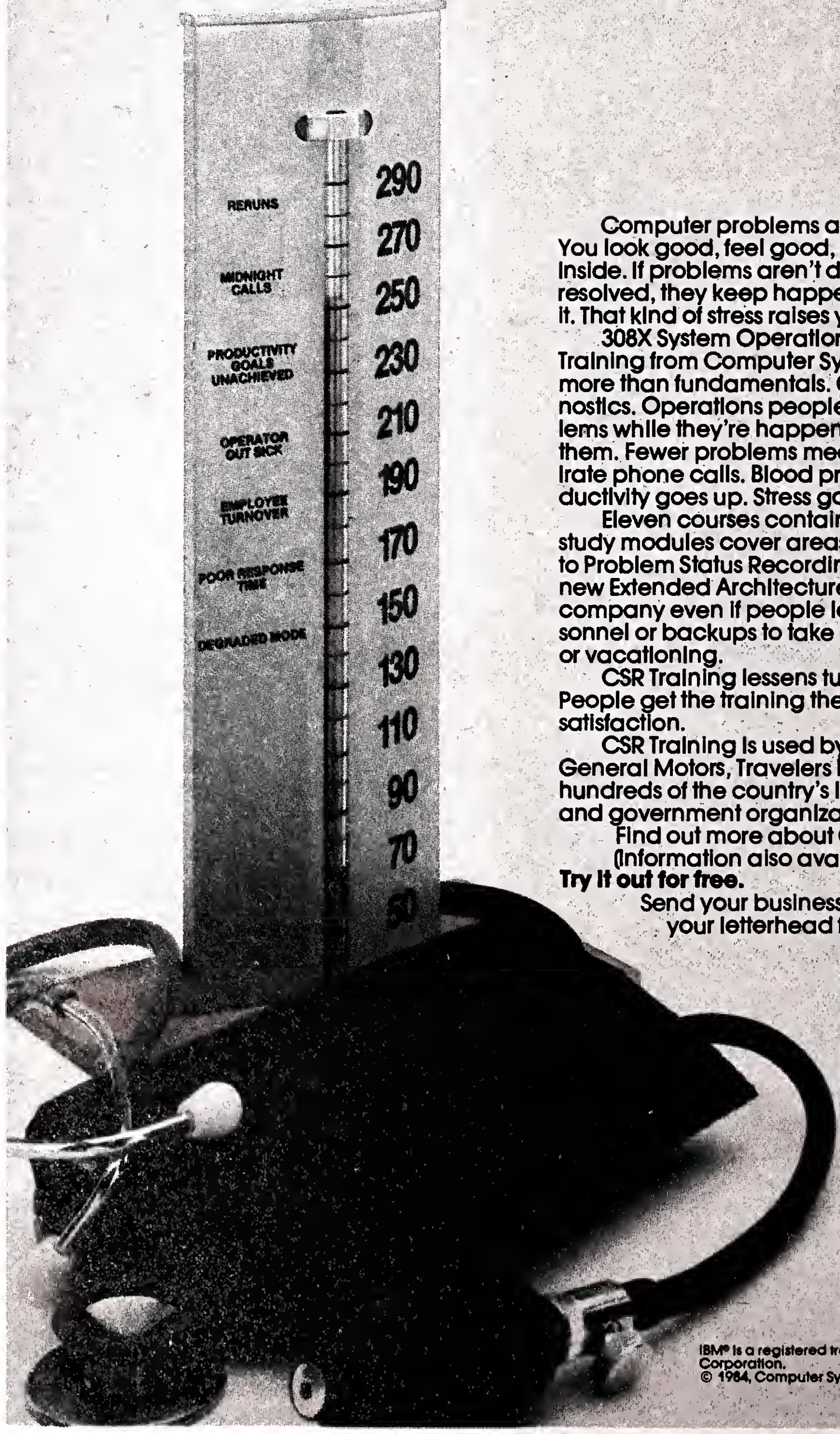

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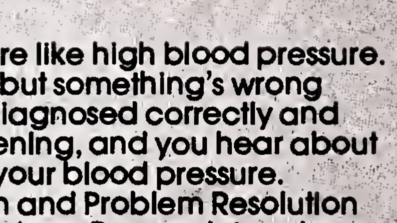

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Bankers seen at forefront of potential videotex boom

By James Connolly
CW Staff

WASHINGTON, D.C. — Bankers, publishers and a handful of retailers can be at the forefront of the videotex/videobanking explosion that is expected in the next two years, a group of bankers was told here recently.

Speakers at the American Bankers Association's National Operations and Automation Conference provided bank operations managers and vice-presidents with updates on home banking and videobanking.

"This isn't the type of thing that individual banks are going to be able to pull off, with the possible exception of some such as Chemical Bank and Citibank NA in New York. It's going to require that we little guys work together," said John H. Fisher, senior vice-president of Banc One Corp. of Columbus, Ohio.

Videotex consortium

Fisher urged banks to work together to control the DP sites that will handle home banking, home shopping and other video transactions. His bank and seven banks in other regions last year formed a consortium called Video Financial Services that is planning videotex operations with nonbank organizations.

In a separate address to the bankers, John L. Wolfe of Arlen Communications, Inc. in Bethesda, Md., said, "Newspaper publishers and financial institutions seem to have the greatest interest in developing such interactive electronic packages and to be the anchors of electronic mail. That's because both industries are burdened with the weight of paperwork and expensive delivery systems today."

A handful of progressive retailers, such as J.C. Penney Co. and Sears, Roebuck & Co., and other companies such as American Express Co., IBM and CBS, Inc. also are eyeing or moving forward in the videotex field, the speakers noted.

Fisher, comparing videotex to the automobile industry, said videotex and videobanking are at the Model T stage, ready to grow with basic, affordable service, as Ford Motor Co. grew with its basic automobile. He noted that pilot projects have been under way for several years and that the explosion in the home banking market should start in 1985 or 1986.

A key to that growth, Fisher said, could be the increasing acceptance of the North American Presentation-Level Protocol Syntax (NAPLPS), a graphics standard that videotex operators hope will be embraced by personal computer makers.

Improved local telephone communications and the ability to link videotex to videodisk and touch-screen equipment also will spur growth, Fisher said.

Wolfe added that it is important that almost all existing videobanking systems use off-the-shelf personal computers for text and numbers only, but that the trend in software development is toward the graphics-oriented NAPLPS.

But he also stressed the importance of marketing home banking. "Nobody sits at home at night wishing he were at the bank," Wolfe said. "Unlike other aspects of today's electronic revolution . . . at-home video banking isn't considered fun or enriching.

"Videobanking will be pushed into existence by the institutions offering the service. It's unrealistic to expect that consumers will pull it along, as they've done with other electronic services. For that reason, telebanking will require incentives to encourage customers to use the system. That might involve discounts for paying bills on-line rather than through paper transactions. Or, to look at it another way, customers will be penalized for in-branch or paper-based transactions."

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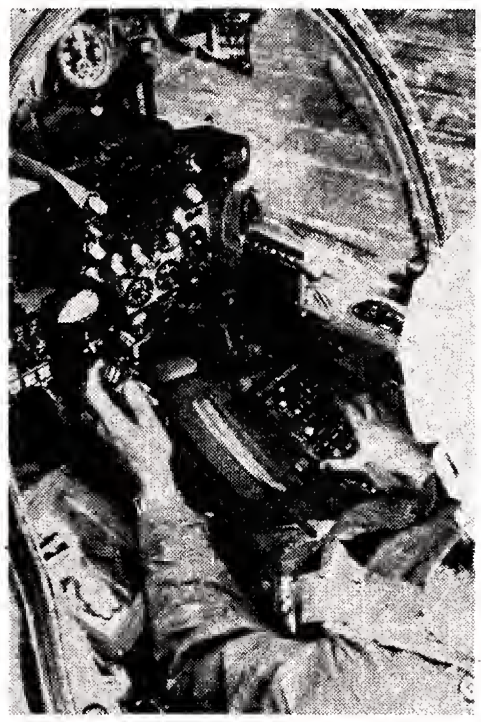

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Business graphics seen converting data to corporate asset

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — Business graphics will play a key role in helping MIS directors achieve their ultimate objective of turning data into a corporate asset, according to AUI Data Graphics, Inc. executive Alan Paller.

Paller's observations came during a program session at the fifth annual conference of the National Computer Graphics Association, held here recently.

One of the major trends among MIS managers these days is their growing awareness that systems and data are strategic business tools and, therefore, need to be made as accessible as possible to their end users. Efforts to fulfill this information system ideal will benefit greatly from the ability of graphics to translate raw statistics and other management data into a form the human mind can easily digest, Paller said.

Another development that will likely influence the graphics arena during the coming few years is the continued proliferation of microcomputers, he predicted. At present, personal computers are limited in their graphics capabilities mainly to producing slides.

But as screen resolutions and computing power steadily improve, the machines' range of graphics applications will substantially widen. Within two years or so, Paller predicted, personal computers will grow fifteenfold to twentyfold in internal throughput and fivefold to sevenfold in disk storage.

The combination of increased capacity, processing horsepower and other features will significantly enhance microcomputer graphics and make the machines suitable as design workstations by 1985 and desktop mainframes by 1986, Paller said.

In other comments, Paller predicted the eventual replication of mainframe graphics tools in medium-scale departmental systems like IBM's 4300 and Digital Equipment Corp.'s VAX-11 series. "The replication process is already under way in 15 or 20 of the country's biggest companies and will begin to spread to all the other firms in the next year," he said.

Paller also predicted several other graphics-related trends, including:

■ A movement toward high-resolution matrix printing.

■ Continuing price cuts that will soon make laser printers the preferred vehicle for producing high-quality black-and-white graphics.

■ The development of slidemakers whose finished products exceed the comparatively limited resolutions of personal computer monitors.

■ The advent of "expert systems" that will automatically adjust graphics layouts and formats to suit different media.

NCGA expands show schedule

ANAHEIM, Calif. — The National Computer Graphics Association (NCGA) next year will expand its conference and exposition program to include the organization's first three regional shows.

Two of the regional events will focus exclusively on the subject of business graphics, Ellen Knapp, NCGA president, announced at the NCGA's fifth annual national conference here recently.

The third will cover the full gamut of graphics-related topics.

The two business-oriented shows will be held here in June 1985 and in Boston the following August. The general-purpose conference will follow in October 1985 in Atlanta and will be cosponsored by the NCGA and its affiliate, the World Graphics Association.

Together, the three regional shows will complement the NCGA's existing national conference, which addresses a broad spectrum of graphics issues and takes place each year in a different city.

The next edition of the national event will be held next April in Dallas.

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Supplier strikes pay dirt with fourth-generation tool

HOUSTON — B.J. Hughes Services, Inc., a major supplier of oil well services here, recently found itself in an increasingly common situation. The company's demand for on-line systems development had grown greater than the company's staff of 14 programmer/analysts could reasonably support.

The evaluation of fourth-generation application development tools, in order to enhance programmer productivity, was then made a high priority. After in-house testing of two such generators, involving the creation of prototype systems, the company chose the Burroughs' Logic and Information Control System (Linc) as the fourth-generation tool to assist in application development.

Hughes had done internal processing on Burroughs' equipment since 1977, when its home office facilities were located in Long Beach, Calif. Hughes moved those facilities and its data processing to Houston in April 1983. Hughes currently has installed two Burroughs B6810 systems operating in a loosely coupled environment with 7.5M bytes of main memory. Hughes also has installed 3.3G bytes of disk storage and a network of 65 CRT and printer terminals.

Darol Jorgensen, manager of information services for Hughes, explained that after the company had acquired Linc in October 1983, the first issue was to develop an interactive sales and billing system, which management had been considering.

Each of the company's 60 field offices was writing customer contracts. Those contracts were forwarded to the Houston location for processing. Once in Houston, the contracts were entered into a batch processing system that simply summarized a manual system used for billing.

Each contract was copied and filed for record keeping, and the original was returned to the customer in the form of an invoice. This process had become a cumbersome and ineffective way of bill processing accounts receivable. The proposed system would fully automate these procedures into an interactive, on-line processing environment.

Because the various field offices were located in various taxing authorities in different states and countries, the correct tax had to be calculated and changed automatically on each customer invoice. The system was also required to interface interactively with the accounts receivable, general ledger and product master systems, which were already in production. To complicate the situation further, the system would have to be developed within a very short time frame to meet management goals.

The system was approved, and it was estimated that its development would require a minimum of three years. One method considered for completing the project was to subcontract three full-time experienced programmers to provide the detail coding and assign two permanent Hughes employees to the management and design control project.

Linc's plusses

This option was rejected because overall cost and development time would have exceeded requirement specifications. The Burroughs' Linc system was chosen because it offered a lower development cost, a projected completion date that was within specifications and the capability to be used in future project development.

The development effort was assigned to Ajoy Rustagi, systems and programming manager for Hughes. Rustagi's responsibilities included both programmer management and system software control. The project began Oct. 1, 1983, and at that time the system's specifications had not yet been started.

By Nov. 1, Rustagi and a team of two programmers were able to complete the system's specifications and to develop a 15-screen working prototype of the system by using Linc.

This prototype was then presented to top management for final approval prior to completion of the application. After receiving full management support, the team completed the entire system and had it ready for production on Jan. 10. The system was tested the following month, and live processing began on Feb. 10.

Rustagi said that "one of the greatest impacts of the Linc system was the increased awareness and involvement of the end users in the development. This is due to the flexibility in Linc to allow changes and additions at late stages of development. This interaction allowed for a smooth implementation and training period."

At Hughes, 2,500 lines of Linc input generated over 10,000 lines of Cobol and data base source statements. "While the project was an overwhelming success," Jorgensen said, "there were some problems. It was difficult initially to get the development tool to run properly on the Hughes system. We had to call on Burroughs personnel to assist."

Future systems planned for Linc development at Hughes include accounts payable, purchase orders and personnel.

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TELECOM BRIEFS
Phil Hirsch
CW Washington Bureau

Nata attacks Centrex inquiry

WASHINGTON, D.C. — An investigation into whether pending Centrex charges should be changed has been attacked by the North American Telecommunications Association (Nata), a trade group that represents independent suppliers of private branch exchanges and other terminal equipment connected to the dial-up telephone network.

The investigation is being conducted by a board composed of three federal and four state communications commissioners. The board is trying to determine whether the surcharges to be levied on Centrex access lines will encourage users to replace the equipment and thus leave local telephone companies stranded with investments in central office facilities.

Nata complained earlier this month that the board has failed to ask "certain key questions." As a result, the phone companies have been given "carte blanche to . . . predetermine the outcome in their favor. Such a course threatens to undermine the [Federal Communications Commission's] basic access-charge decision," Nata said.

AT&T told to set new Lata billing

WASHINGTON, D.C. — U.S. Federal District Court Judge Harold Greene has directed AT&T and the former Bell operating companies to establish a new billing system for customers who use both inter-Lata (Local Access and Transport Area) and intra-Lata 800 service.

Charges currently are calculated by statistically sampling the service mix. This arrangement will continue while the new system is implemented, a process that will take several months.

Under the new system, AT&T will supply local telephone operating companies with data on a daily basis to enable them to determine actual inter- and intra-Lata 800 service usage.

AT&T asks FCC for depreciation

WASHINGTON, D.C. — AT&T has asked the Federal Communications Commission to let it use a quicker method of depreciating switches, cables and other network facilities installed before 1982.

Financial analysts suggested the move presaged an AT&T request for higher rates, because the effect would be to increase the company's costs. Such a request, they indicated, might represent an attempt by AT&T to recoup some of the revenue it lost as a result of the FCC decision earlier this month that requires AT&T to reduce its Message Toll Service and Wats rates 6.1%.

A spokesman for AT&T vigorously denied any connection between the FCC decision and his company's accelerated depreciation request. If granted, the latter would reportedly increase AT&T's depreciation expenses by $960 million annually and add approximately 3% to its revenue requirement. According to the spokesman, this wouldn't necessarily cause the company to ask for higher rates.

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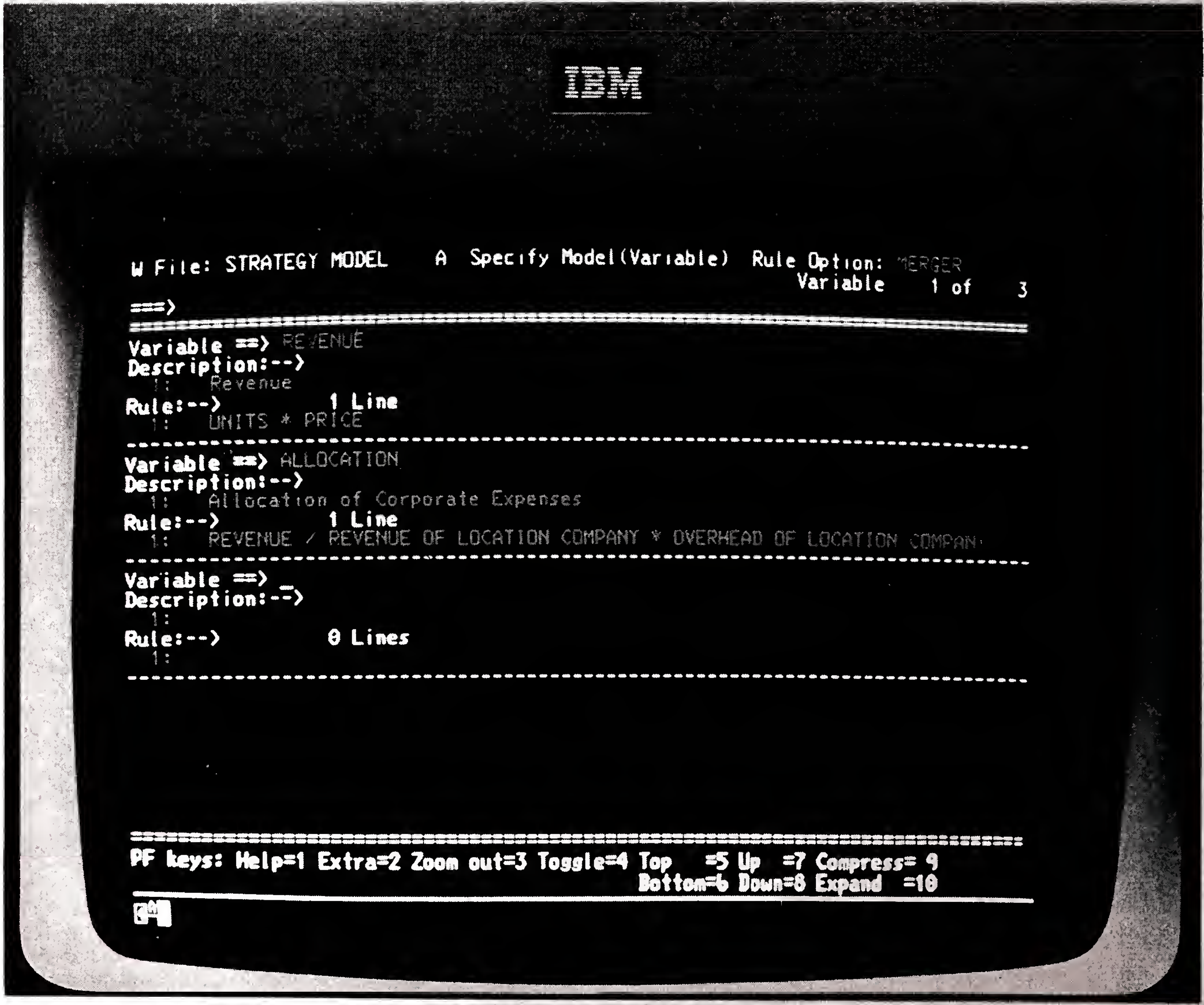

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W File: STRATEGY MODEL    A  Specify Model(Variable)  Rule Option: MERGER
                                                      Variable    1 of    3
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Variable ==> REVENUE
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Rule:-->            1 Line
   1:   UNITS * PRICE
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Variable ==> ALLOCATION
Description:-->
   1:   Allocation of Corporate Expenses
Rule:-->            1 Line
   1:   REVENUE / REVENUE OF LOCATION COMPANY * OVERHEAD OF LOCATION COMPAN
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Variable ==> _
Description:-->
   1:
Rule:-->            0 Lines
   1:
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================================================================================
PF keys: Help=1 Extra=2 Zoom out=3 Toggle=4 Top   =5 Up   =7 Compress= 9
                                          Bottom=6 Down=8 Expand   =10
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DBMS gets aircraft development off the ground

Relational system allows departments to access interrelated information

LINKOPING, Sweden — For engineers involved in aircraft development, constant communication and interaction between various disciplines are critical elements in the design process. Thanks to a recently implemented relational data base management system (DBMS), several departments at Saab-Scania AB's Aircraft Division here are able to access interrelated information via a networked data base. Saab's stress analysis, computer-aided design and manufacture (CAD/CAM), aerodynamics and flight test departments, as well as its simulation center, share engineering data relevant to designing civilian and military aircraft.

Saab, an organization with worldwide operations and 40,000 employees, has three major divisions — truck, car and aircraft. The Saab Aircraft Division, with 7,000 people, is responsible for designing and manufacturing military and civilian aircraft.

In the past, according to Gunnar Hermanson, head of the coordination group, data exchange among the various departments in the aircraft division was less than ideal. Each department had its own software programs, although output from one area often became input for another department. In order for separate departments to use the same data, which was generated as tables or graphs, information had to be more or less manually reentered.

"There were several problems inherent in our old system," Hermanson said. "The development process slowed down, and project costs increased because of the difficulty of transferring data. Certain engineering optimizations that required fast iteration were too time-consuming to carry out."

Datacom Project

In an effort to solve the problems, the Datacom Project was initiated. "The main point in the Datacom Project is communicating data from one department to another. We set a goal to develop utilities, methods and techniques that would considerably decrease the amount of work needed to transfer engineering data," Hermanson said. "We also wanted to provide for future expansion of data and software programs. We searched for approaches that would be easy to understand and meaningful to the user."

Hermanson said the project group considered continuing to use files to transfer data, but rejected that option in favor of a relational DBMS from Oracle Corp. of Menlo Park, Calif. However, because of speed considerations in Oracle, files would still be used for storing things such as large matrices.

"Relational DBMS are very attractive to us because they provide a lot of independence between the data and the programs. With a relational system, there is the possibility of changing data definitions without altering programs already working on the data base. The level of independence is such that you can change the programs without changing the data, or you can manipulate the data definitions without altering the programs.

"A relational DBMS is also easy to understand," he continued, "and a data structure can quickly be agreed upon when it is represented in a set of tables."

In late 1981, Saab-Scania began evaluating DBMS. After looking at three relational systems, the project group decided on the Oracle DBMS.

"We chose Oracle because it is superior in a number of conceptual areas, one of them being its architecture, which enabled us to implement a distributed work load. The hardware environment for the Datacom Project consists of three Digital Equipment Corp. VAX-11/780s and two VAX-11/782s," Hermanson said. "In its current configuration, the application programs and the data base may be housed on separate VAXs, but since the VAX-11/780 on which the data base is located is networked (using Decnet) to all the other computers, data can be transported from machine to machine.

"As an example," Hermanson said, "suppose the CAD/CAM department generates geometric data that describes a wing or a fuselage. The data goes from that department into the data base, where both the aerodynamics and the stress analysis departments can then access the information and incorporate it into their own calculations."

According to Hermanson, on Saab's Datacom Project, Oracle supports approximately 20 engineers who can access the data concurrently. "Altogether, a total of more than 50 engineers within the aerospace division use Oracle, and that number is growing as more programs are developed using the system."

Hermanson said other features that influenced the aerospace divi-

See **DBMS** page 36

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DBMS

from page 35

sion's decision to buy Oracle include its active data dictionary, security and transaction logging capability, high-degree logical data independence, multiuser capability and its data language, SQL Plus.

SQL Plus, which is a superset of the SQL data language developed by IBM, allows users to define data with a common language. Information is displayed for Saab's engineers in a form to which they are already accustomed — two-dimensional tables.

"The tabular representation of the data in a relation makes it easy to communicate and to agree upon in the data definition process," Hermanson noted. "The links between the relations aren't hidden from the users. There is a consistent and complete set of operations to be performed on the tables, and future data manipulation is possible."

Because Oracle's SQL Plus can be used from programs written in standard programming languages, Saab's engineers are able to make use of an increasing number of existing application programs written in Fortran. Sculptured surface, stress analysis and aerodynamic models, for instance, can all communicate with the data base.

The aerodynamic model program for the JAS39 aircraft, a military airplane being developed for the Swedish Air Force, uses a model and data stored in the DBMS. Engineers can assign specific aerodynamic parameters — how fast the aircraft can turn, speed at various motor power settings and so forth — and determine how the aircraft will respond in a given situation.

An extended data dictionary facility in the Datacom Project data base, which will use an estimated 500M bytes of memory, is implemented using a number of tables that list projects to which the data belongs and that also state who is responsible for the data. Each time a data base table is added, deleted or modified, the dictionary is automatically updated, guaranteeing that the next user to access the information is using the most current data and list of tables. It also contains descriptions of the contents of tables and columns.

Hermanson said Saab recently installed a Cray Research, Inc. Cray 1 supercomputer to speed solution of finite element and aerodynamic problems where complex algorithms are executed on large data volumes. The Cray and the VAX containing the data bases will be joined.

> *'Relational DBMS . . . provide a lot of independence between the data and the programs. With a relational system, there is the possibility of changing data definitions without altering programs already working on the data base. The level of independence is such that you can change the programs without changing the data.'* — Gunnar Hermanson, head of Saab's coordination group.

In addition to the Datacom Project, Hermanson mentioned other programs that use the relational DBMS. A flight test planning application, for instance, allows Saab to control more accurately the administration of flight test activities.

Another application is used to establish the weight of aircraft in the design stages. At different stages of development, the system collects the weights of individual parts. Looking at the weight of the various parts, engineers can quickly determine the total weight and point of gravity.

For the future, Hermanson intends to bring more data to the DBMS and to explore the possibility of using Oracle's graphics extension to present data in graphics form. A major goal is to extend the services of the DBMS while constantly enhancing the convenience of the system for its users.

To date, however, the Oracle approach has produced significant gains in both time and money. "Because it is easy to agree on a data structure between different departments, and because of the system's high degree of independence, ongoing new software developments will be accomplished much faster," Hermanson concluded.

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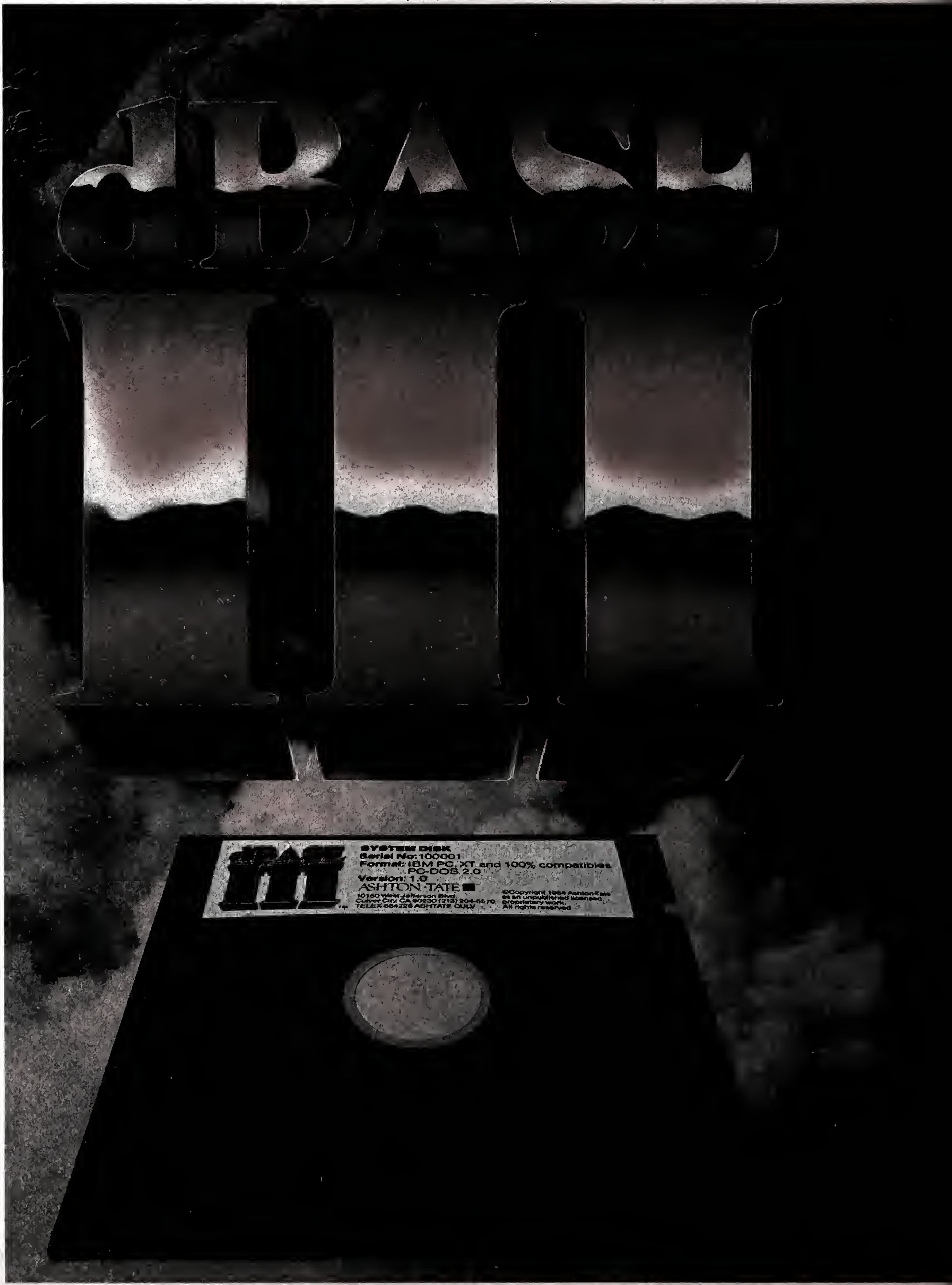
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Joint venture takes hard look at bank productivity

Project used to develop means of measuring productivity for interbank comparison

DETROIT — Productivity, the buzzword of the 1980s for many American businesses, was the subject of a serious joint research venture between the Bank Administration Institute of Rolling Meadows, Ill., and the American Productivity Center of Houston in 1982.

The goal of the project was to develop a means of measuring bank productivity for meaningful interbank comparison. The result was a theory and a methodology using a macro approach to measure productivity by product lines throughout a financial institution (as opposed to traditional function-in-proportion-to-time measures).

The creation of this theory and methodology brought with it the challenge to develop a practical, realistic system for implementation in the banking community. Not only would new data have to be identified and developed, but ad hoc query, extensive reporting and easy data base maintenance capabilities would also be required.

Five financial institutions volunteered to participate in the project to develop an application for implementing the productivity methodology. Limited by time restrictions and adherence to the methodologies identified in the study, each institution was allowed to develop its own version of the application the way it felt best met the needs of the project.

As a result of this project, Manufacturers National Bank of Detroit set a high standard of productivity of its own in its design and implementation of the new productivity methodology system. In January 1984, the bank, ahead of schedule, tested its first set of analysis reports. The system was developed using Ramis II, a fourth-generation language and data base management system produced by Mathematica, Inc. of Princeton, N.J.

"Fourth-generation language was definitely the way to go," said Martin Metzker, operations officer and manager of productivity at the bank.

Data for the Total Bank Productivity Measurement System was gathered and entered by non-data-processing personnel using the menu-driven panel component of the basic Ramis II system. Actual programming for the application was completed in 120 workdays over a four-month period by the bank programming staff and members of a Mathematica consulting team.

Almost exclusively on-line, the application produces 10 standard monthly reports plus a quarterly analysis and summary from Ramis II and IMS files on the bank's IBM 3083 running under TSO. "End users can access information and prepare their own simple reports after a two-hour demonstration," Metzker added. More than 30 services (such as wire transfers, commercial loans and letters of credit) are covered by the application, and all output produced by the bank is measured against all bank input resources expended.

The application was developed in two phases, according to Dave Rayford, second vice-president and systems officer. In the first phase, a 30-page working document (outlining file design, calculations, a user manual and system components) was created during the initial three weeks of the project by the bank's systems and productivity staff, along with a member of the Mathematica consulting staff. The second phase implemented the application design.

Ramis II was essential for prototyping the application, Metzker said. "We knew how the application would look long before it was ever programmed." In addition, the project's early completion was largely due to expanding the prototype into the full-fledged Total Bank Productivity Measurement System.

The Total Bank Productivity Measurement application gives a global view of data, using two Ramis II data bases containing 15 permanent files. Updates of the data in these data bases is conducted by end users. "The system also taps into existing personnel, payroll, general ledger and other automated systems," Rayford said.

"We can have the information we want any time and any way we want to cut it. We are able to monitor the productivity of the entire bank and compare our productivity with other participating financial institutions," Metzker concluded.

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Systems development tools cut applications backlog

SHAUMBURG, Ill. — Zurich-American Insurance Co., based here, is part of an international group that is among the top five insurance companies in the world. The firm has begun to cut its applications backlog back to the point at which it began, according to Howard Feinman, senior vice-president of corporate processing services.

"On one recent development effort, automated general ledger," Feinman said, "we've found that by using the SDM/70 methodology, the level of maintenance and enhancements, which contributes to the backlog, is much smaller than previously anticipated."

The SDM/70 methodology is part of a family of systems development and maintenance methodologies offered by AGS Management Systems, Inc. of King of Prussia, Pa.

"On the employee travel advance system, an accounting system," said Patricia O'Shea, methodology coordinator at Zurich-American, "we've had no enhancements or user changes for the seven months since it was installed.

"When I was writing up the post-implementation review," O'Shea continued, "I found that users actually were able to participate on the project team and did the same tasks as team members during the first two SDM/70 phases, especially the systems requirements definition. What this meant was that the users got the system they needed. The absence of enhancements or changes is a record. It's saving our company money, because rework adds to our backlog and means additional expense."

To cut down further on service requests that unnecessarily add to the backlog, Zurich-American is requiring project valuation assessments for all such requests.

Project valuation

"A project valuation assessment," explained Tim Splitt, assistant manager of quality assurance at Zurich-American, "permits each service request to be assessed in terms of its reinforcement of corporate goals, tangible and intangible benefits, risk considerations, costs and responsibilities. We're using the SDM/70 project administration guidelines as the basis for this. We expect that by requiring project valuation assessments, only the systems that are most important to the company will be worked on."

Zurich-American is also performing post-implementation reviews to analyze the benefits and cost data of existing systems, to determine system effectiveness and to identify improvement opportunities. This will enable it to group enhancements for each system into one umbrella service request, which can then be handled as a planned release. Although this may not reduce the backlog, it will enable Zurich-American to manage such work properly and, therefore, reduce costs.

To manage the backlog, as well as current development, Zurich-American uses the PAC II project management system offered by AGS.

"What the combination of these two systems has provided for us," Feinman said, "is a reporting technique and the ability, from a business point of view, to direct our resources effectively. We can now account for the time spent by all of our resources and can allocate them according to business objectives. The information generated by PAC II is used in my reviews with corporate management to determine how we can best direct our efforts to benefit the company."

SDM/70 and PAC II were acquired in 1981. Prior to that, there was no methodology, no standard approach to projects, and the project control system it had was more of an accounting and timekeeping system.

"Originally, time-reporting was spotty at best," explained Deborah Keyes, project control administrator at Zurich-American. "We now have between 90% to 95% of our resources reporting time to PAC II. Planning is where SDM/70 comes in. We're using the SDM/70 tasks with their estimating guidelines to build our development plans. Use of SDM/70 is still optional, but we've found it significant that when those who are planning projects don't use the standard SDM/70 tasks, we can't audit their work easily."

To manage all of the work in the queue, four systems development and enhancement life cycles have been defined, based upon SDM/70, according to O'Shea.

"These include efforts less than 30 days, from 30 to 70 days, from 70 to 100 days and any effort over 100 days. For each, we've defined who is responsible for performing the work, the level of user approval, at what level PAC II tracking is required (that is, milestone vs. activity), what level of SDM/70 task is required and if the methodology coordinator should function as an in-house consultant."

"We're now presenting quarterly resource utilization reporting for senior corporate management to show how our resources are being utilized," Splitt said, "and to show what backlog exists and to determine how resources should be shifted to accomplish corporate goals."

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INTERNATIONAL REPORT

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AUSTRALIA

SYDNEY — The Melbourne and Sydney stock exchanges have, through their wholly owned subsidiary, acquired two Tandem Computers, Inc. TXP Nonstop processors. The subsidiary said it chose the TXPs because of the "potential volatility of stock market processing," echoing the American, New York and London stock exchanges in their selection of the redundant processors.

CHINA

BEIJING — Control Data Corp. has signed a long-term joint research and development contract with China's Administration of Computer Industry. CDC will cooperate with the administration in technical interchange, planning, manufacturing and sales of DP products in China as well as with service and the training of personnel. According to CDC, the first priority under the agreement is to transfer the technology of CDC's Winchester disk drives to the administration.

■

BEIJING — Hewlett-Packard Co. signed an agreement in principle with the China Electronics Import and Export Corp. to establish a joint venture company to manufacture and distribute HP products in China. If the pact is finalized, the new company will be called China-Hewlett-Packard-Ltd.

■

BEIJING — Computerland Corp. has penned a letter of intent with the Chinese Ministry of the Electronics Industry for a joint venture to sell microcomputers in China. Retail outlets, called Computerland China, would be established in China under the terms of the agreement. Headquartered in Oakland, Calif., Computerland currently operates some 650 stores in 25 countries.

FRANCE

PARIS — During the Special Salon International de l'Informatique de la Communication et de l'Organisation du Bureau conference held here recently, the British company Rair, Ltd. unveiled what it calls the first supermicrocomputer based on Intel Corp.'s IAPX 286 microcomputer. Designed for multiuser applications (nine to 12 users), the Rair Supermicro is said to be two times as powerful as Motorola, Inc. 68000-based systems and 50% more powerful than Digital Equipment Corp.'s VAX-11/780 supermini. The system operates under Digital Research, Inc.'s Concurrent CP/M 3.1; a Microsoft, Inc. Xenix version is reportedly in the works. A typical configuration costs $12,500.

JAPAN

TOKYO — Japanese microcomputer shipments exceeded 1 million last year — a 50% jump from the previous year's total, according to a recent study from the Japanese Electronic Industry Development Association. Presently, 8-bit computers enjoy an 82% share of the market, while 16-bit systems hold the remaining 18%, although these products are expected to gain at least 40% of the market by 1987.

■

TOKYO — Bravice International has unveiled a Japanese-to-English automatic translation turnkey system. The 16-bit Brauzce Pak 11/73 is based on Digital Equipment Corp.'s PDP-11/73 minicomputer and is available in two versions, both featuring 40,000 words.

NETHERLANDS

AMSTERDAM — Olivetti Corp. will open 10 of its "Olivetti Shop" computer franchises here this year, a Dutch Olivetti spokesman said.

■

AMSTERDAM — British Telecom International, the German Bundespost and the Postal, Telephone and Telegraph (PTT) administrations of Belgium and the Netherlands will jointly develop the first fiber-optic cable between England and the Belgium coast. The project, slated to be completed in 1985, will consist of three monomode fibers, each able to handle 280 millions of instructions per second, according to a spokesman.

■

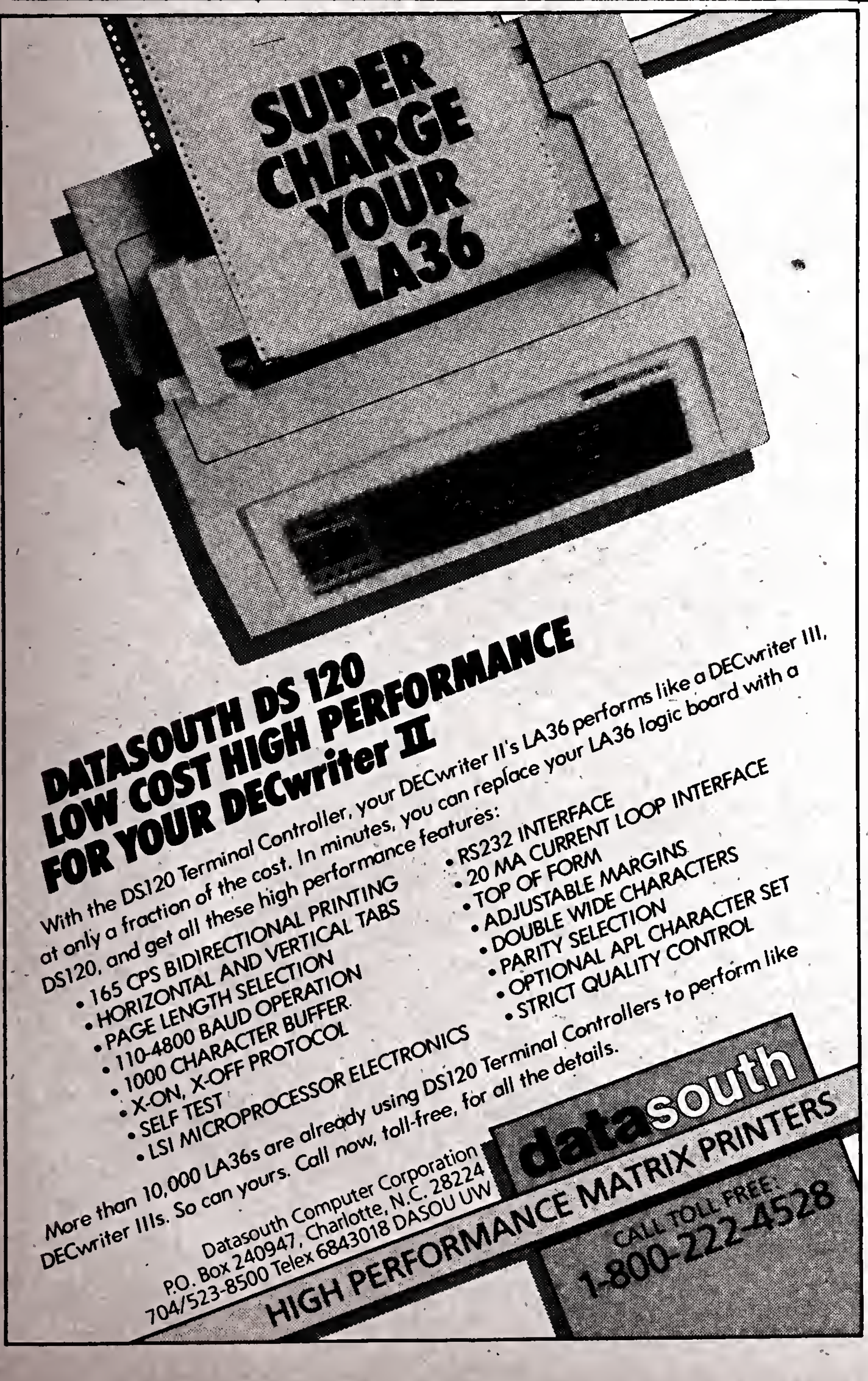
AMSTERDAM — Dutch and Belgian software experts formerly employed by Control Data Corp. have founded a company called Qint Database Systems Corp., with offices in Holland, Belgium and the U.S. One of the founders is Gerard M. Nijssen, known for his Nijssen Information Analysis Methodology.

WEST GERMANY

MUNICH — Berhard Sauer, business director at Amdahl Deutschland GmbH, quit the company after 1½ years of service reportedly due to "insurmountable differences" with Amdahl's European management team in London. Sauer's predecessor, Dieter Knoppke, left Amdahl for the same reason in 1981. Both men joined the Hamburg, W. Germany-based computer leasing company ICC after leaving Amdahl.

■

MUNICH — Micropro International Corp. has shut down its European headquarters here. Insiders blamed the closing on Micropro's lagging business in the U.S., a recently established subsidiary in Japan and a general need to reduce management staff.



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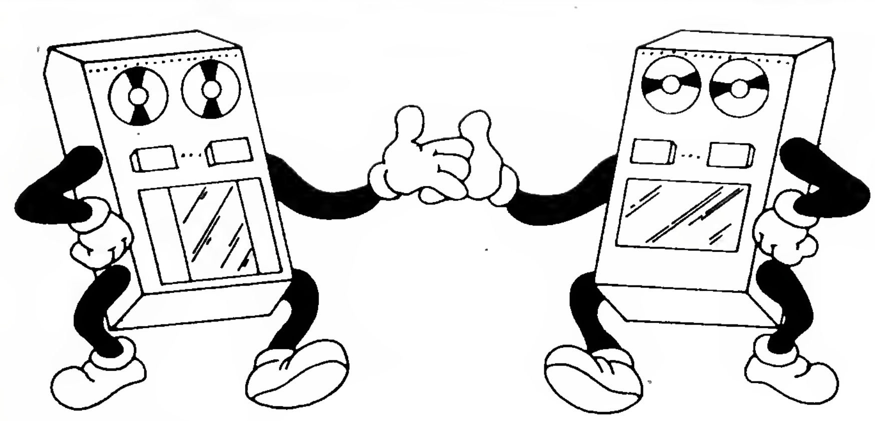

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NEWS

On-line report generator makes hands-on users of school's staff

CINCINNATI — An on-line report writer package is making a growing number of administrative and staff workers "hands-on" users of the University of Cincinnati's data processing center here.

The university's information center, which was established in 1980, is currently serving more than 100 users. Two programmers and a systems analyst from the school's computing center, which operates an IBM 3033 and an Amdahl Corp. 470V/7 under IBM's OS/VS, have been assigned to develop the information center and train its users.

According to Paula Miller, one of the programmers assigned to the application support/information center area, most information center users are from the university's finance, auditing, payroll and personnel departments. In addition, the center is utilized by a hospital and a blood bank associated with the university. Users are typically middle-management level personnel, including an assistant director in charge of payroll, an internal auditor and a nursing station manager.

In order to provide users with a tool for on-demand report generation, the information center staff recently installed Informatics General Corp.'s Answer/DB on-line report writer package. Running under the school's on-line IBM CICS teleprocessing monitor, Answer/DB provides interactive editing and syntax-checking capabilities and gives users a simplified language with which they can design their own reports, Miller said.

Miller said new users are given a training session that first familiarizes them with the computer terminal and the keyboard. The information center staff then instructs users in the basic concepts of utilizing Answer/DB — for example, how to create, save and submit a report, how to list the library and how to make changes to an existing report program. Finally, users learn how to access a file and actually select the records with which to build a report.

After undergoing two half-day training sessions, Miller said, most users are able to log on to the computing center's mainframes and create and run their own reports."One of the features that is most valuable to us is Answer/DB's error-checking ability. It automatically checks for any 'type three' errors, those which would terminate a job, and it issues an error message. Users don't have to go through a complete run to find out that they have caused an error by misspelling a name."

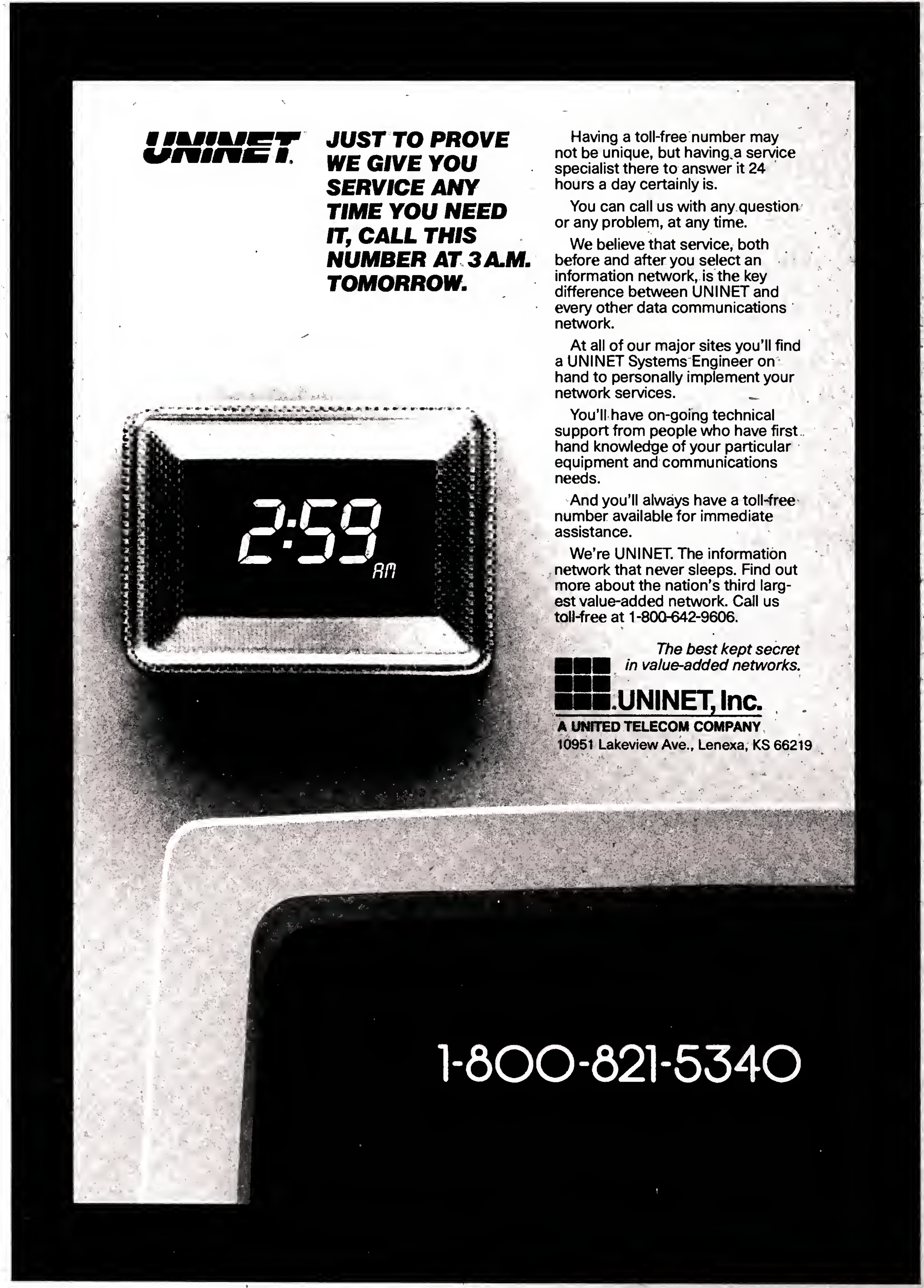
Use of classrooms

Miller said a typical reporting program developed by the school's end users is one which helps the registrar's office schedule the use of classrooms.

Written by a member of the registrar's staff, the program generates reports indicating which classroom is being used for what subject at any time so classroom space can be more effectively utilized.

The finance department in one of the hospitals associated with the university uses another program developed under Answer/DB to produce reports that show, on a department-by-department basis, to which cost center an employee's time should be charged. That program also keeps track of employee vacation and sick time, as well as overtime, according to Miller.

"While Answer/DB is used primarily as an information center tool at [the university], staff programmers in the computing center also find it useful," Miller said. "For example, they will often use Answer/DB to test out a new file, to locate errors and to ensure that they have good record information."



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Remote network drives BMW's data management

System oversees global financial, operating functions

MUNICH — In the '70s, it became obvious that if Bavarian Motor Works AG was to continue its pattern of efficient growth, a business information management system would be needed to oversee both financial and operating functions.

The company already had channels of information linking the various subsidiaries in the firm, but the growth of BMW was generating an increasing volume of data, making efficient management more difficult, according to Gehart Thatner, head of the Management Methods Department at BMW.

BMW subsidiaries reported to the parent company on an irregular and informal basis, and although both the parent company and the subsidiaries were equipped with data processing centers, BMW needed a flexible system capable of providing a global financial picture and reliable data communications. By relying on General Electric Information Services Co.'s (Geisco) worldwide remote computing network, BMW was able to solve its information management problems.

Financial reporting system

Priority was given to evolving a financial reporting system that BMW could utilize to make business and financial decisions on a daily basis. In the course of development, it was decided that this type of management information should be complemented by a planning system that could project results, budgets and monthly sales forecasts, provide current trading results, forecast liquid assets, consolidate data and compile detailed analytical reports, Thatner said.

The system is also used for management reporting on nonfinancial data, such as sales and marketing forecasts, as well as financial consolidation data.

"Within a few seconds we can establish the sales situation of our eight main subsidiaries, accounting for 80% of our exports, and this enables us to arrive at the right decisions about our management policy and our products," Thatner said.

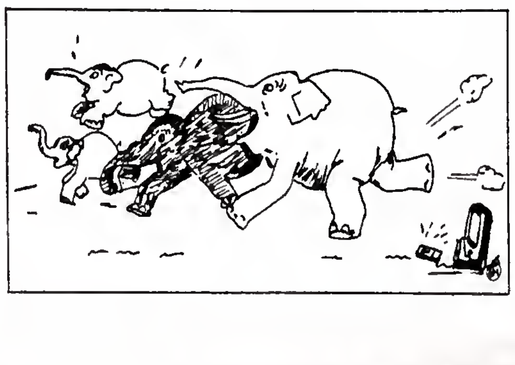
The BMW management information system is integrated and designed to fit users' needs. Each new system module is supported by those that have preceded it, and general standards are applicable to all modules. In addition, all planning activities are carried out according to a clearly defined and standardized pattern.

This standardization means that everyone speaks the same language. It also means that the data input at various terminals is in a consistent format. Input grids displayed on the screen used by the subsidiaries are in the local language, and the same is true of the reports compiled by each of the subsidiaries to meet their specific needs.

Because the entire system operates on the Geisco teleprocessing network, no BMW hardware is required except for data entry terminals. Data input procedures have been established at BMW, and security measures ensure that procedures are followed. One result of all this is that certain programs and/or data can be accessed only by BMW headquarters. On the other hand, some data is accessible to everyone, although it can be changed or updated only by specified persons. The subsidiaries are responsible for the management of their own data.

To meet the needs of the users, a marketing system was required to provide significant data about BMW's current position in the local market. This information is used by the parent and the subsidiary companies as the basis for marketing decisions. The system also must supply data in the most convenient possible form, make this information accessible as quickly as possible and minimize the manual interventions involved in processing the data.

"We have found that the management information system has a number of distinct advantages. First, the quality of the data is consistently high, and the error rate is quite low. In addition, the data can be made available to all subsidiary locations. The system also allows for considerable flexibility. A large number of hypotheses can be simulated and allowances can be made for a variety of major external influences. The management and financial decision-making data is also available on a timely basis. Relieved of the drudgery inherent in the planning process, executives can turn their attention to the creative side of management," Thatner said.



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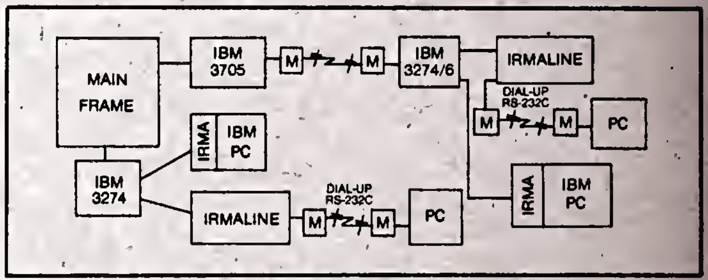

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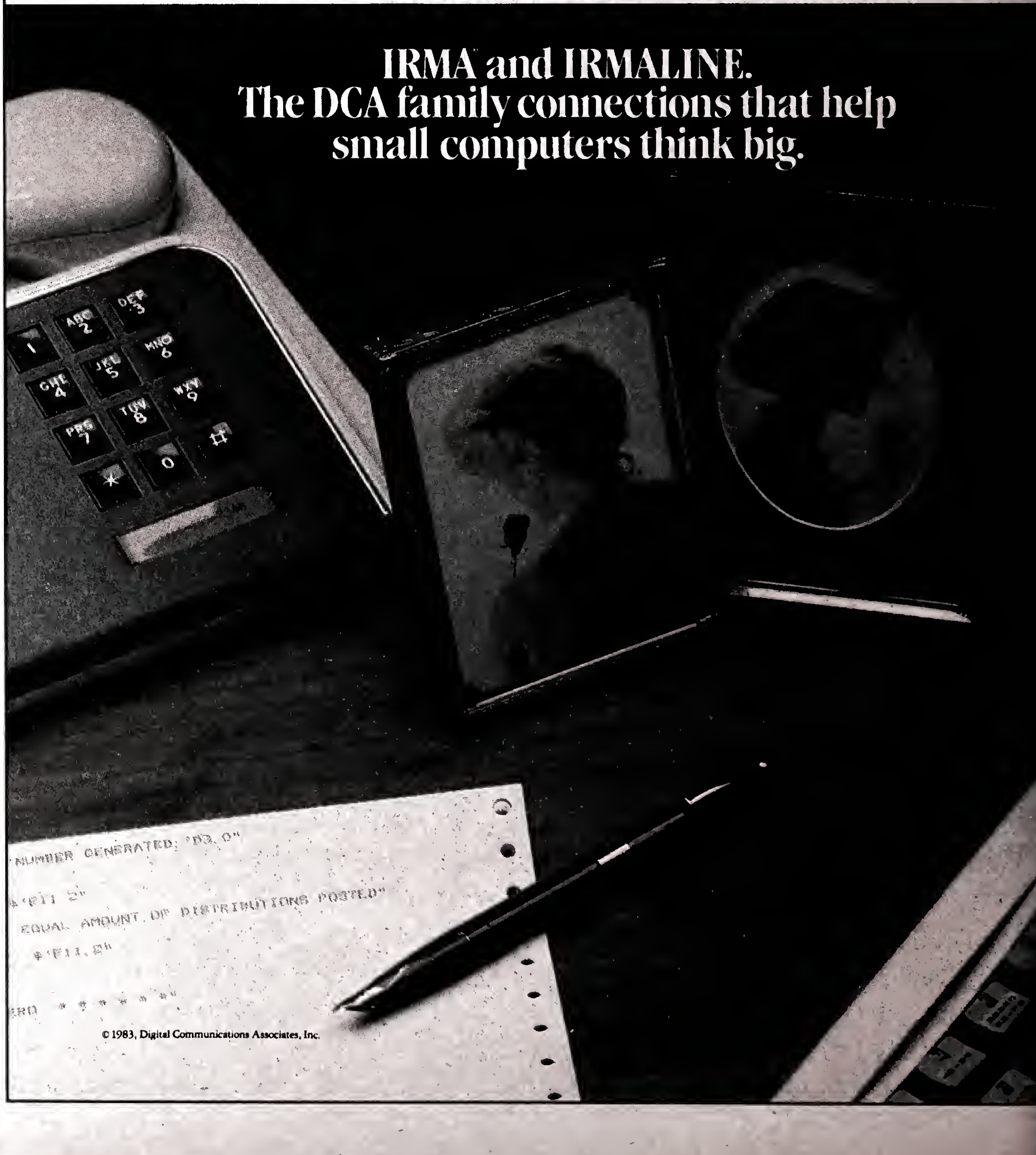
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Relational tool helps B&H maintain growing data base

CHICAGO — Bell & Howell (B&H), one of the oldest and largest firms in the northern suburbs of Chicago, is highly diversified, with business ranging from audiovisual equipment manufacturing to technical education. Traditionally, B&H has relied heavily on packaged computer systems for its application requirements.

As the MIS function evolved at B&H, however, it became apparent that internally developed applications could, in many instances, better address the unique requirements of many of the company's divisions. B&H also began to plan the implementation of an information center that would allow users to access mainframe data.

With these two goals in mind, a team led by L. R. Hoose, manager of applications technical support in the B&H corporate MIS group, began to evaluate available data base tools along with fourth-generation languages. "We realized that in an information center environment, we would be experiencing a great deal of change," Hoose said. "We anticipate that often a user will define a system and a program will be written, only to find that the business requirements have changed and enhancements are needed. What we wanted was a system that could be maintained by only a few people; that seemed to push us automatically toward a relational data base."

In March 1983, after several months of extensive systems evaluation, B&H purchased Applied Data Research, Inc.'s (ADR) Ideal, Datacom/DB, Datadictionary, Dataquery and Datareporter. Although Ideal was still in beta testing, B&H decided to purchase it based on the strength and integration of the other software components, its experience with ADR's Roscoe and The Librarian as well as ADR's reputation. B&H felt that an important strength of Datacom/DB was the multiuser facility, which allows batch, on-line and multiple on-line access concurrently.

While awaiting the formal release of Ideal, B&H installed the other ADR products. Although Shelley Ochab, manager of decision support systems, did not have formal training in programming, she worked with Dataquery and Datareporter extensively. "I have a data base with two files of about 60,000 records each," she said, "and two more files with 4,000 to 5,000 records. I have written reports in both Datareporter and Dataquery that link the four files together to produce the needed information."

Once Ideal was installed in September 1983, several MIS staff members attended training classes conducted on-site at B&H by ADR. Mike Strysik, manager of data base support, believes that the 2½ day session was sufficient to educate people with simple program development goals. "Due to the complex nature of the work I wanted to do in Ideal, it has taken me about two months on the learning curve," he said. As Strysik pointed out, the more he worked with Ideal, the quicker the development cycle became. He said he is now at the point where he can work on several programs simultaneously and put up a file "in a matter of a few days."

Ambitious goals

Strysik has ambitious goals. "I have written about a dozen programs in Ideal. My goal is to write systems that are easy to use, that maintain data efficiently and that are user-friendly," he explained. "I want the system to function such that a person can sit at a terminal and bring up a menu that identifies the applications he is allowed to utilize. I want scrolling capabilities, an index of what is in one file or an index of whatever information the user wants to access and the ability to look at an item in more detail by selecting it from the index. That is what I wanted, and that is what I got with Ideal and Datacom/DB."

An experienced IMS user, Strysik said he now sees the advantages in a relational data base. "The support necessary with Datacom/DB is minimal," he noted.

Ochab also attended the Ideal course and has been working on information center applications with corporate management. In addition to providing users with access to existing data from the mainframe, she is developing on-line data entry screens and programs in Ideal to be used for loading and maintaining new data bases. Once one of Ochab's users has set up a new data base, he can use Dataquery and Datareporter to produce reports utilizing this information.

Tom Daronatsy, a systems analyst, uses Ideal's panel development facility. "In Ideal, you can develop a panel and do a facsimile to see exactly how it will look," he explained.

Ochab summed up B&H's expectations: "Because the end users will be able to do many of their routine reporting requests themselves, Ideal will increase productivity in both the user and the MIS departments. It will encourage managers to ask more questions about information and to spend more time analyzing rather than gathering data, leading to better decisions than in the past."

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Productivity aid insures firm against JCL errors

LONG GROVE, Ill. — Steve Fowler, a development center analyst at the Kemper Group, used to spend sleepless nights worrying about his production jobs running at the office. This worry is one he shared with many others in his chosen profession.

Things are different for Fowler and other Kemper programmers these days. The company is using JCLcheck, a programmer productivity aid from Triangle Software Co. of San Jose, Calif. Fowler calls JCLcheck his security blanket.

The Kemper Group, which has its headquarters here, is the 13th largest of the several thousand property casualty insurance companies in the U.S. Its data processing department supports 8,000 employees.

The firm's central computer system includes one 24M-byte IBM 3081, one 32M-byte IBM 3081, one 16M-byte IBM 3083 and one 24M-byte IBM 3083. The operating system is MVS/XA, with a TSO system that supports 378,000 transactions per day. In addition to 470 terminals within the home office, Kemper headquarters supports an additional 540 remote terminals nationwide. According to Fowler, "During 1983, we ran more than a million tests and 250,000 production jobs. Before JCLcheck, we had no way of intercepting potential test and production failures due to JCL errors."

Fowler chairs a development aids committee that was created recently for Kemper's 400-person DP department. "This committee facilitates the technical exchange of ideas between the application development personnel and the technical units," he said. "At these meetings, programmers expressed frustration over the time it took to pinpoint JCL errors and the wasted hours spent rerunning jobs that failed because of undetected JCL errors.

"What emerged was a search to locate a solution to this frustration," Fowler reported.

The search led Kemper to JCLcheck, a system utility package that provides syntactical and logical validation of a JCL stream before it is submitted to the system for a test or production run.

According to Fowler, "Our alternatives were two. We could write a system in-house, which would have required several technicians and potentially years of coding, plus the dedicated machine time and resources. The second alternative was to do nothing at all, which would have become the more expensive alternative.

Fewer errors

"Even though the use of JCLcheck is strictly voluntary today, the number of errors has decreased 38% since its installation," Fowler commented.

"Our programmers who now work with JCLcheck have found it very easy to use." Fowler said. "It basically takes only two minutes to learn how to invoke JCLcheck.

"Some Kemper programs change constantly, while others are revised only every year or so," he said. "JCLcheck provides nine documentation reports, including data set and program cross-reference listings. Our technicians find the job stream documentation helpful.

"Our project teams, meanwhile, find the summary report cross-reference for multijob production systems valuable because they can determine how one job affects another.

"Above all, JCLcheck has become our security blanket," Fowler said. "Like most other large DP operations, we run our production jobs at night. Before JCLcheck, when I'd go home, I'd have this slightly nagging worry about whether I'd come back the next morning to find my job hadn't run. Now, I don't have to worry."

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CALENDAR

WEEK OF JULY 1

JULY 2-3, BOSTON — **The Relational Data Base.** Contact: The American Institute for Professional Education, Carnegie Building, 100 Kings Road, Madison, N.J. 07940. Also being held July 12-13 in Chicago, July 19-20 in Minneapolis and July 26-27 in Rochester, N.Y.

JULY 5-6, SAN FRANCISCO — **Managing Projects in the Structured Environment.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 5-6, NEW YORK — **CICS Performance Design.** Contact: Sysed, One Park Ave., New York, N.Y. 10016.

JULY 5-6, CHICAGO — **Systematic Software Testing.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 5-6, NEW YORK — **IMS Recovery and Restart.** Contact: Sysed, One Park Ave., New York, N.Y. 10016.

WEEK OF JULY 8

JULY 9-10, SAN FRANCISCO — **Introduction to Teleconferencing Systems.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

JULY 9-10, BALTIMORE — **Supporting and Maintaining the Data Communications Network.** Contact: Data-Tech Institute, P.O. Box 569, 386 Franklin Ave., Nutley, N.J. 07110. Also being held July 16-17 in Danvers, Mass., July 23-24 in San Diego and July 26-27 in Detroit.

JULY 9-11, CHICAGO — **Data Communications I — Basic Concepts.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

JULY 9-12, LAS VEGAS — **The 1984 National Computer Conference.** Contact: Trudi Riley, American Federation of Information Processing Societies, Inc., 1899 Preston White Drive, Reston, Va. 22091.

JULY 9-13, SUNNYVALE, CALIF. — **Workload Analysis and Forecasting.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

JULY 9-13, DALLAS — **Software Development Performance Engineering.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

JULY 9-13, NEW YORK — **Advanced Structured Analysis.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 9-13, WASHINGTON, D.C. — **Project Planning and Control Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 9-13, ATLANTA — **Structured Analysis and Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held July 9-13 in Indianapolis and San Francisco.

JULY 9-13, CHICAGO — **Structured Analysis and System Specification Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 9-13, NEW YORK — **IMS Data Base Design.** Contact: Sysed, One Park Ave., New York, N.Y. 10016.

JULY 10-12, NEW YORK — **Introduction to Telecommunications.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

JULY 10-13, WASHINGTON, D.C. — **Hands-On Unix Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held July 24-27 in San Diego.

JULY 11-12, SAN FRANCISCO — **Local-Area Networks.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

JULY 11-13, HASBROUCK HEIGHTS, N.J. — **Data Communications.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705. Also being held July 18-20 in Boston and July 25-27 in Houston.

JULY 11-13, NEW YORK — **Artificial Intelligence.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 11-13, BOSTON — **Structured Analysis for Users.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 11-14, DALLAS — **The 59th Annual National Office Machine Dealers Association (Nomda) Convention and Trade Show.** Contact: Nomda, 810 Lively Blvd., Wood Dale, Ill. 60191.

JULY 12-13, LAS VEGAS — **IBM's Future: The Next 10 Years.** Contact: Gartner Group, Inc., P.O. Box 10212, 72 Cummings Point Road, Stamford, Conn. 06940.

WEEK OF JULY 15

JULY 15-18, CHICAGO — **The 1984 International SPSS Software Users Exchange (Issue) National Conference.** Contact: Issue, Inc., Suite 1970, 444 N. Michigan Ave., Chicago, Ill. 60611.

JULY 15-18, HARTFORD, CONN. — **The 1984 Summer Conference and Exposition of Hardware, Supplies and Services.** Contact: Recognition Technologies Users Association, P.O. Box 2016, Manchester Center, Vt. 05255.

JULY 16-17, BOSTON — **Software Requirements Analysis.** Contact: The Education Foundation of the Data Processing Management Association Seminars, Department SRA, P.O. Box 3608, 3420 Kashiwa St., Torrance, Calif. 90510.

JULY 16-17, BOSTON — **Supporting and Maintaining the Data Communications Network.** Contact: Data-Tech Institute, P.O. Box 569, 386 Franklin Ave., Nutley, N.J. 07110. Also being held July 23-24 in San Diego and July 26-27 in Detroit.

JULY 16-18, NEW YORK — **Job Control Language.** Contact: Chubb Institute, 8 Sylvan Way, Parsippany, N.J. 07054.

JULY 16-18, WASHINGTON, D.C. — **Creating Effective Computer-Aided Instruction.** Contact: Ware Associates, P.O. Box 948, Groton, Conn. 06340.

JULY 16-18, ATLANTA

See **JULY** page 48

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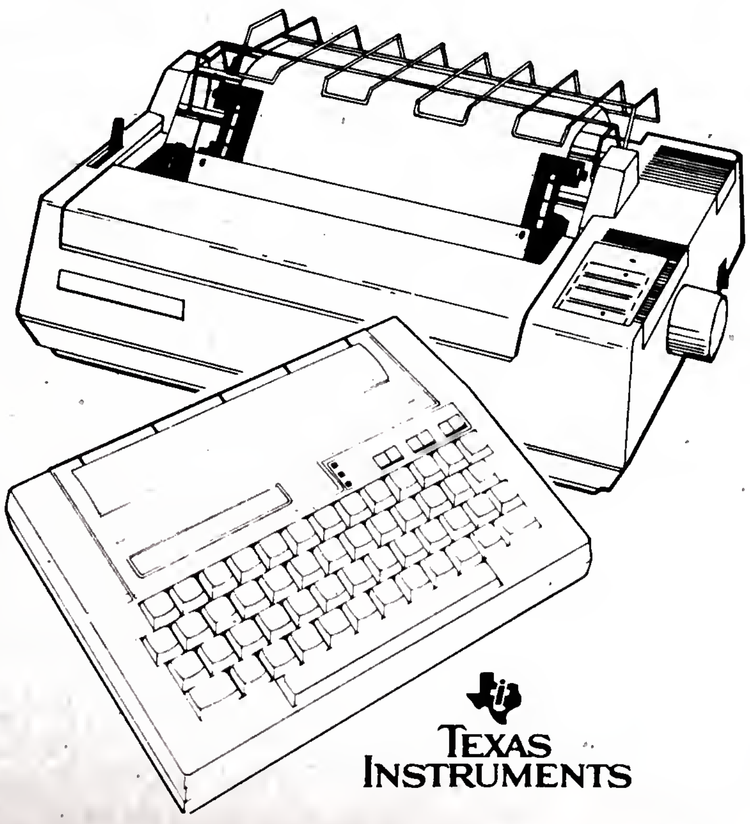

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NEWS

JULY from page 47

— **Capacity Management Forum.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

JULY 16-20, HOUSTON — **Structured Analysis and Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036. Also being held July 16-20 in New York.

JULY 16-20, NEW YORK — **IMS/DB Application Programming.** Contact: Sysed, One Park Ave., New York, N.Y. 10016.

JULY 16-20, LONG BEACH, CALIF. — **Structured Analysis for Real-Time Systems.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 16-20, SUNNYVALE, CALIF. — **MVS Systems Management.** Contact: Institute for Software Engineering, 510 Oakmead Pkwy., Sunnyvale, Calif. 94086.

JULY 16-20, LAS VEGAS — **How to Develop an Effective Long-Range Data Processing Plan.** Contact: Keston Associates, 11317 Old Club Road, Rockville, Md. 20852.

JULY 16-20, PHILADELPHIA — **Structured Analysis and System Specification Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 16-20, ATLANTA — **Structured Design Workshop.** Contact: Yourdon, Inc., 1133 Ave. of the Americas, New York, N.Y. 10036.

JULY 17, PALO ALTO, CALIF. — **Strategic Information Systems for Competitive Advantage.** Contact: The High Technology Management Group, Suite 420, 850 Boylston St., Chestnut Hill, Mass. 02167.

JULY 17-18, WASHINGTON, D.C. — **PBXs vs. LANs: Selecting Your System.** Contact: Architecture Technology Corp., P.O. Box 24344, Minneapolis, Minn. 55424. Also being held July 25-26 in San Francisco.

JULY 17-19, SEATTLE — **Microcomputer Data Base Management Systems.** Contact: Software Institute of America, 8 Windsor St., Andover, Mass. 01810.

JULY 17-19, MOUNT POCONO, PA. — **Focus on Data.** Contact: Du Pont Statistical Seminars, Room X-40236, Wilmington, Del. 19898.

JULY 17-20, WASHINGTON, D.C. — **Programming in C: A Hands-On Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held July 31-August 3 in San Diego.

JULY 17-20, WASHINGTON, D.C. — **Designing with 16-Bit Micros.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held July 24-27 in Boston.

JULY 17-20, CHICAGO — **Vsam File Structures.** Contact: Software Information Services, Inc., P.O. Box 4132, Bellevue, Wash. 98009.

JULY 17-20, LOS ANGELES — **Computer Network Design and Protocols.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held July 31-August 3 in Washington, D.C.

JULY 17-20, BOSTON — **Implementing Local-Area Networks.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held July 24-27 in Washington, D.C.

JULY 17-20, WASHINGTON, D.C. — **Data Communications.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045. Also being held July 31-August 3 in San Diego.

JULY 17-20, SAN DIEGO — **Designing Real-Time Systems: A Hands-On Workshop.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045.

JULY 17-20, SAN DIEGO — **Distributed Processing: Mini- and Microcomputer Implementation.** Contact: Ruth Dordick, Integrated Computer Systems, P.O. Box 45404, 6305 Arizona Place, Los Angeles, Calif. 90045.

JULY 17-21, CHICAGO — **The Association of Information Systems Professionals (AISP) Annual Syntopican XII.** Contact: AISP Conference Services, 1015 North York Road, Willow Grove, Pa. 19090.

JULY 18-19, NEW YORK — **Financial Analysis for Telecommunications Equipment Acquisition.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521.

JULY 18-20, SOMERSET, N.J. — **Unix.** Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92706. Also being held July 26-27 in Portland, Ore., and July 30-August 3 in Minneapolis.

JULY 19-20, CHICAGO — **Integrating Voice and Data in the PBX.** Contact: Business Communications Review, 950 York Road, Hinsdale, Ill. 60521. Also being held July 30-31 in New York.

JULY 19-20, CHICAGO — **SPSS-X for Coordinators and Consultants.** Contact: SPSS, Inc., Technical Services, 444 N. Michigan Ave., Chicago, Ill. 60611.

JULY 20, CHICAGO — **Report Writing with SPSS-X.** Contact: SPSS Inc., Technical Services, 444 N. Michigan Ave., Chicago, Ill. 60611.

WEEK OF JULY 22

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1. BUSINESS/INDUSTRY (Circle One)
End Users
- 10 Manufacturer (other than computer)
- 20 Finance/Insurance/Real Estate
- 30 Medicine/Law/Education
- 40 Wholesale/Retail Trade
- 50 Business Service (except DP)
- 60 Government—State/Federal/Local
- 65 Public Utility/Communication Systems/Transportation
- 70 Mining/Construction/Petroleum/Refining
- 75 Other User ______

Vendors
- 80 Manufacturer of Computers, Computer-related Systems or Peripherals
- 85 Computer Service Bureau/Software/Planning/Consulting
- 90 Computer/Peripheral Dealer/Distributor/Retailer
- 95 Other Vendor ______

2. OCCUPATION/FUNCTION (Circle One)
- 11 President/Owner/Partner/General Manager
- 12 VP/Assistant VP
- 13 Treasurer/Controller/Financial Officer
- 21 Director/Manager/Supervisor DP/MIS Services
- 22 Director/Manager of Operations/Planning/Administrative Services
- 23 Systems Manager/Systems Analyst
- 31 Manager/Supervisor Programming
- 32 Programmer/Methods Analyst
- 35 OA/WP Director/Manager/Supervisor
- 38 Data Comm Network/Systems Mgmt
- 41 Engr/Scientific/R&D/Tech Mgmt
- 51 Mfg Sales Reps/Sales/Marketing Mgmt
- 60 Consulting Mgmt
- 70 Medical/Legal/Accounting Mgmt
- 80 Educator/Journalist/Librarian/Student
- 90 Other ______

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as user, vendor or consultant
- A. Mainframes/Superminis
- B. Minicomputers/Small Business Computers
- C. Microcomputers/Desktops
- D. Communications Systems

IN DEPTH

Models for management

Following the leaders

U.S. high-technology firms need not look overseas for ways to improve their management practices in order to outpace foreign competitors.

By Modesto A. Maidique and Robert H. Hayes

Over the past 15 years, the world's perception of U.S. companies' competence in managing technology has come full circle. In 1967, Jean-Jacques Servan-Schreiber observed with alarm in his book, *The American Challenge*, that U.S. technology was far ahead of the rest of the industrialized world. This "technology gap," he argued, was continually widening because of the superior ability of Americans to organize and manage technological development.

Today, the situation is perceived to have changed drastically. The concern now is that the gap is reversing: The onslaught of Japanese and/or European challenges is threatening America's technological leadership. In *America's Technology Slip*, Dr. Simon Ramo noted the apparent inability of U.S. companies to compete technologically with their foreign counterparts. And in the best-seller *The Art of Japanese*

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The companies we studied all confronted the same dilemma: how to unleash the creativity that promotes growth and change without being fragmented by it and how to control innovation without stifling it.

Management, R. Pascale and A. Athos used as a basis of comparison two technology-based firms, Matsushita and ITT. The Japanese firm was depicted as a model for managers, while the management practices of the U.S. firm were sharply criticized.

Nevertheless, a number of U.S. companies appear to be fending off these foreign challenges. These firms are repeatedly included on lists of "America's best-managed companies." Many of them are competitors in the research- and development-intensive industries, a sector of our economy that has come under particular criticism. Ironically, some of them have even served as models for highly successful Japanese and European high-tech firms.

For example, of the 43 companies T.J. Peters and R.H. Waterman Jr. judged "excellent" in *In Search of Excellence*, almost half were classified as "high technology," or as containing a substantial high-technology component. Similarly, of the five U.S. organizations William Ouchi described as best prepared to meet the Japanese challenge, three (IBM, Hewlett-Packard Co. and Eastman Kodak Co.) were high-technology companies.

Indeed, high-technology corporations are among the most admired firms in America. In a Fortune study that ranked the corporate reputation of the 200 largest U.S. corporations, IBM and HP ranked first and second. And of the top 10 firms, nine compete in such high-technology fields as pharmaceuticals, precision instruments, communications, office equipment, computers, jet engines and electronics.

These studies reinforce our own findings, which have led us to conclude that U.S. high-technology firms that seek to improve their management practices to succeed against foreign competitors need not look overseas. The firms mentioned above are not unique. On the contrary, they are representative of scores of well-managed small and large U.S. technology-based firms. Moreover, the management practices they have adopted are widely applicable.

Perhaps the key to stimulating innovation in our country is not to adopt the managerial practices of the Europeans or the Japanese, but to adapt some of the policies of our own successful high-technology firms.

The study

Over the past two decades, we have been privileged to work with a host of small and large firms as participants, advisers and researchers. We and our assistants interviewed formally and informally more than 250 executives, including more than 30 chief executives, from a wide cross section of high-tech industries — biotechnology, semiconductors, computers, pharmaceuticals and aerospace.

About 100 of these executives were interviewed in 1983 as part of a large-scale study of product innovation in the electronics industry [conducted by Modesto Maidique and his colleagues]. Our research has been guided by a fundamental question: What are the strategies, policies, practices and decisions that result in successful management of high-technology enterprises?

The companies we studied were of different sizes ($10 million to $30 billion in sales), their technologies were at different stages of maturity, their industry growth rates and product mixes were different and their managers ranged widely in age. But they all had the same unifying thread: a rapid rate of change in the technological base of their products. This rapid technological change implies novel products and functions and, thus, usually rapid growth. But even when growth is slow or moderate, the destruction of the old capital base by new technology results in the need for rapid redeployment of resources to cope with new product designs and new manufacturing processes. Thus, the two dominant characteristics of the high-technology organizations that we focused on were growth and change.

In part because of this split focus, the companies we studied often appeared to display contradictory behavior over time. Despite these differences, in important respects they were remarkably similar because they all confronted the same dilemma: how to unleash the creativity that promotes growth and change without being fragmented by it and how to control innovation without stifling it. In dealing with this concern, they tended to adopt strikingly similar managerial approaches.

When we grouped our findings into general themes of success, a significant paradox gradually emerged. Some of the behavioral patterns that these companies displayed seemed to favor promoting disorder and informality, while others would have us conclude that it was consistency, continuity, integration and order that were the keys to success. As we grappled with this apparent paradox, we came to realize that continued success in a high-technology environment requires periodic shifts between chaos and continuity. Our originally static framework, therefore, was gradually replaced by a dynamic framework within whose ebbs and flows lay the secrets of success.

Six themes of success

We grouped our findings into six themes: business focus, adaptability, organizational cohesion, entrepreneurial culture, sense of integrity and "hands-on" top management. No one firm exhibits excellence in every one of these categories at any one time, nor are the less successful firms totally lacking in all. Nonetheless, outstanding high-technology firms tend to score high in most of the six categories, while less successful ones usually score low in several.

1. Business focus. Even a superficial analysis of the most successful high-technology firms leads one to conclude that they are highly focused. With few exceptions, the leaders in high-technology fields realize the great bulk of their sales either from a single product line or from a closely related set of product lines.

This extraordinary concentration does not stop with the dominant product line. When the company grows and establishes a secondary product line, it is usually closely related to the first. IBM's two closely related product lines — data processing systems (approximately 80% of sales) and office equipment — both emphasize the business market.

Companies that took the opposite path have not fared well. Two of yesterday's technological leaders, ITT and RCA, have paid dearly for diversifying away from their strengths. Today, both firms are trying to divest many of what were once highly touted acquisitions. As David Packard, chairman of the board of HP, once observed, "No company ever died from starvation, but many have died from indigestion."

A communications firm that became the world's largest conglomerate, ITT began to slip in the early 1970s after an acquisition wave orchestrated by Harold Geneen. When Geneen retired in 1977, his successors attempted to redress ITT's lackluster performance through a far-reaching divestment program. So far, 40 companies and other assets worth more than $1 billion have been sold off — and ITT watchers believe the program is just getting started. Some analysts believe that ITT will ultimately be restructured into three groups, with the communications/electronics group and engineered products (home of ITT semiconductors) forming the core of a "new" ITT.

RCA experienced a similar fate. When RCA's architect and longtime chairman, General David Sarnoff, retired in 1966, RCA was internationally respected for its pioneering work in television, electronic components, communications and radar. But by 1980, the three chief executive officers who followed Sarnoff had turned a technological leader into a conglomerate with flat sales, declining earnings and a $2.9 billion debt. This disappointing performance led RCA's new CEO, Thorton F. Bradshaw, to decide to return RCA to its high-technology origins. Bradshaw's strategy now is to concentrate on RCA's traditional strengths — communications and entertainment — by divesting its other businesses.

Focused R&D. Another policy that strengthens the focus of leading high-technology firms is concentrating R&D on one or two areas. Such a strategy enables these businesses to dominate the research, particularly the more risky, leading-edge explorations. By spending a higher proportion of their sales dollars on R&D than their competitors do, or through their sheer size (as in the case of IBM, Kodak and Xerox), such companies maintain their technological leadership.

It is not unusual for a leading firm's R&D investment to be 1½ to two times the industry's average as a percent of sales (8% to 15%) and several times more than any individual competitor on an absolute basis.

Moreover, their commitment to R&D is both enduring and consistent. It is maintained through slack periods and recessions because it is believed to be in the best long-term interest of the stockholders. Ray Stata, CEO of Analog Devices, a leading linear integrated circuit manufacturer, explained in a quarterly report which noted that profits had declined 30%, "We are sharply constraining the growth of fixed expenses, but we do not feel it is in the best interest of shareholders to cut back further on product development . . . in order to relieve short-term pressure on earnings."

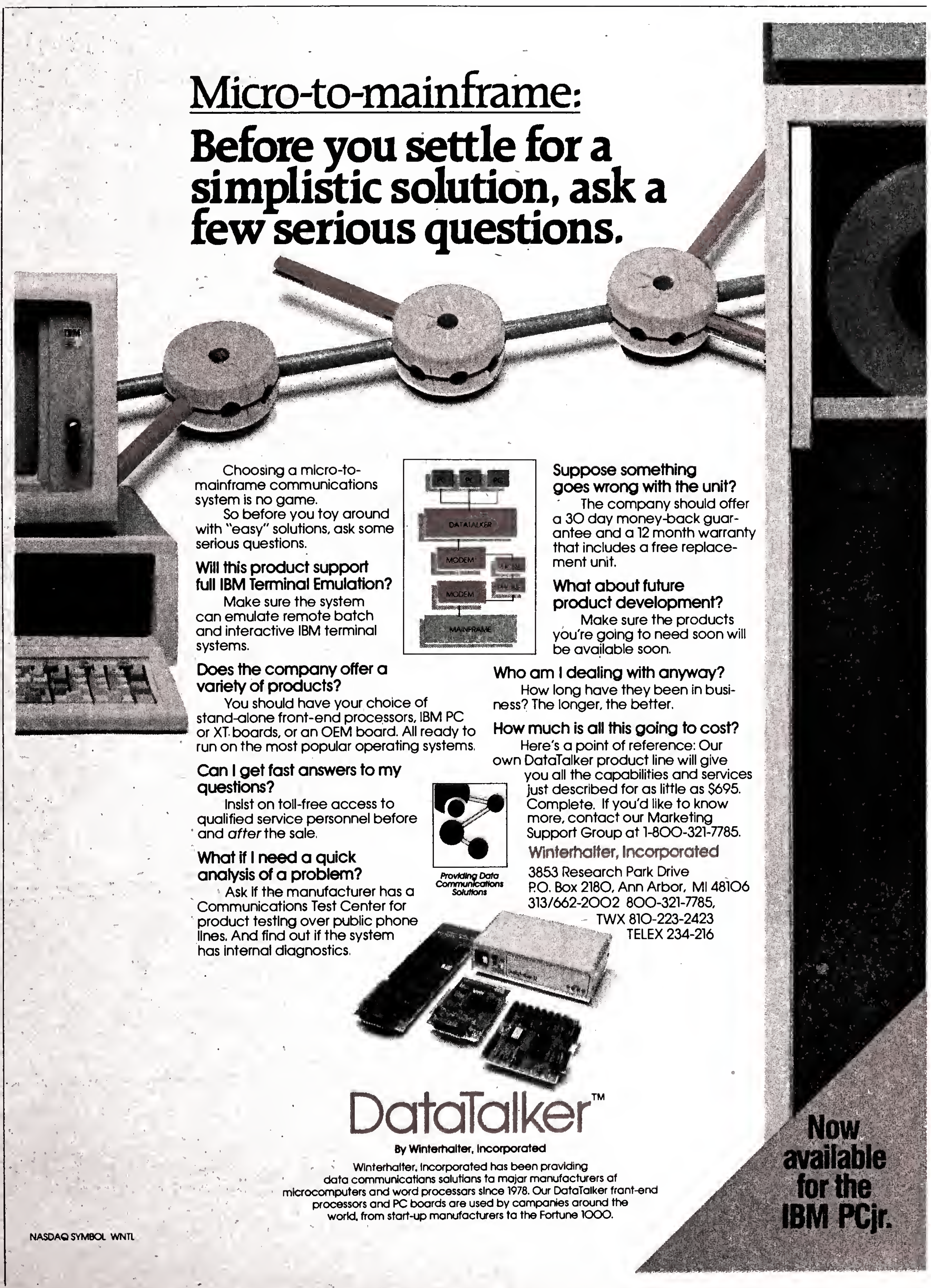
Similarly, when sales flattened and profit margins plummeted at Intel as a result of a recession, its management invested a record-breaking $130 million in R&D and another $150 million in its plant and equipment.

Consistent priorities. Still, another way that a company demonstrates a strong business focus is through a set of priorities and a pattern of behavior that are continually reinforced by top management: for example, planned manufacturing improvement at Texas Instruments, Inc., customer service at IBM, the concept of the entrepreneurial product champion at 3M and the new products at HP. Belief in the competitive effectiveness of their chosen theme runs deep in each of these companies.

A business focus that is maintained over extended periods of time has fundamental consequences. By concentrating on what it does well, a company develops an intimate knowledge of its markets, competitors, technologies and employees and of the future needs and opportunities of its customers.

The Stanford Innovation Project recently completed a three-year study of 224 U.S. high-technology products (half of which were successes, half failures) and concluded that a continuous, in-depth, informal interaction with leading customers throughout the product development process was the principal factor behind successful new products. In short, this coupling is the cornerstone of effective high-technology progress. Such an interaction is greatly facilitated by the longstanding and close customer relationships that are fostered by concentrating on closely related product-market choices.

2. Adaptability. Successful firms balance a well-defined business focus with the willingness to under-



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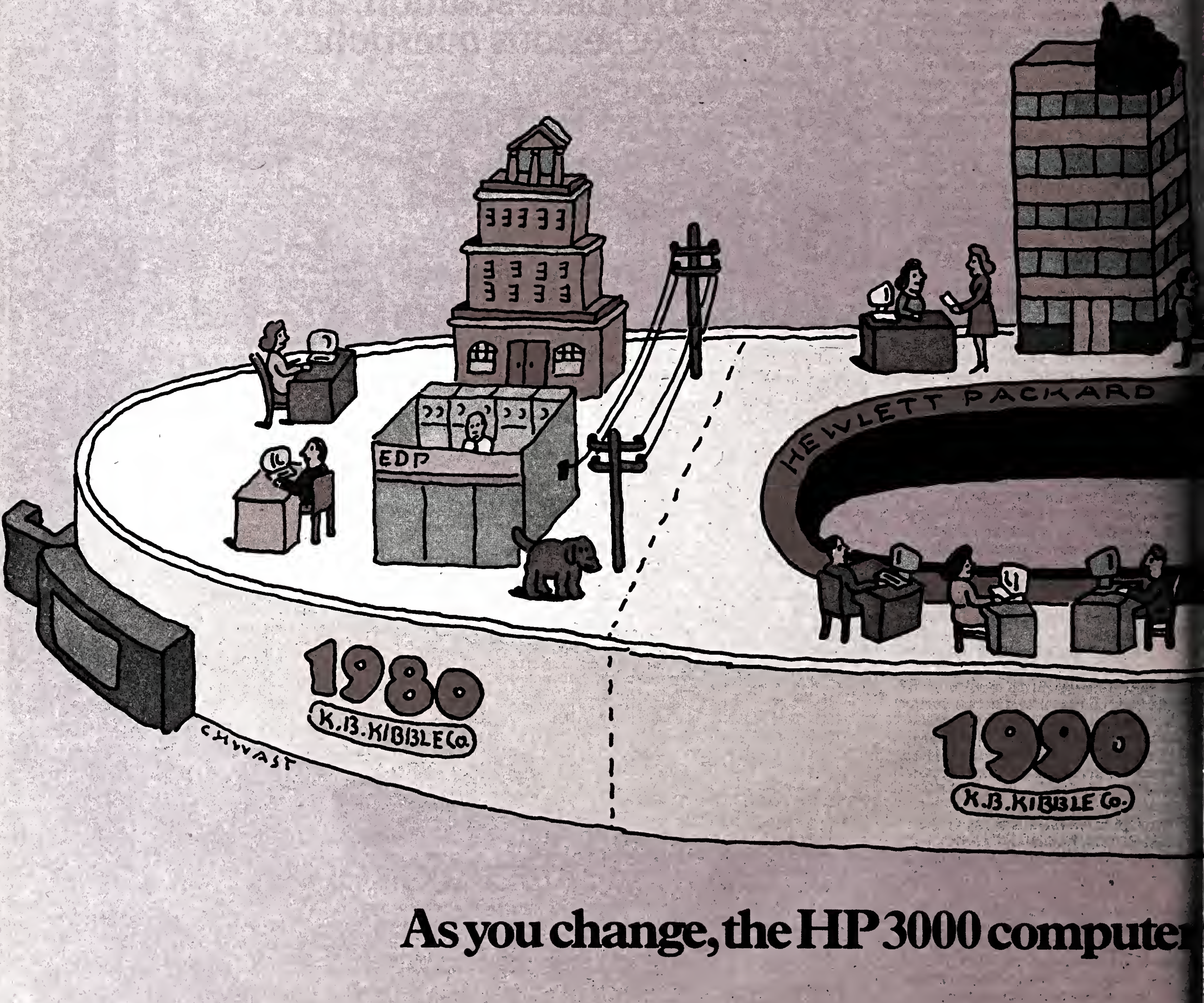

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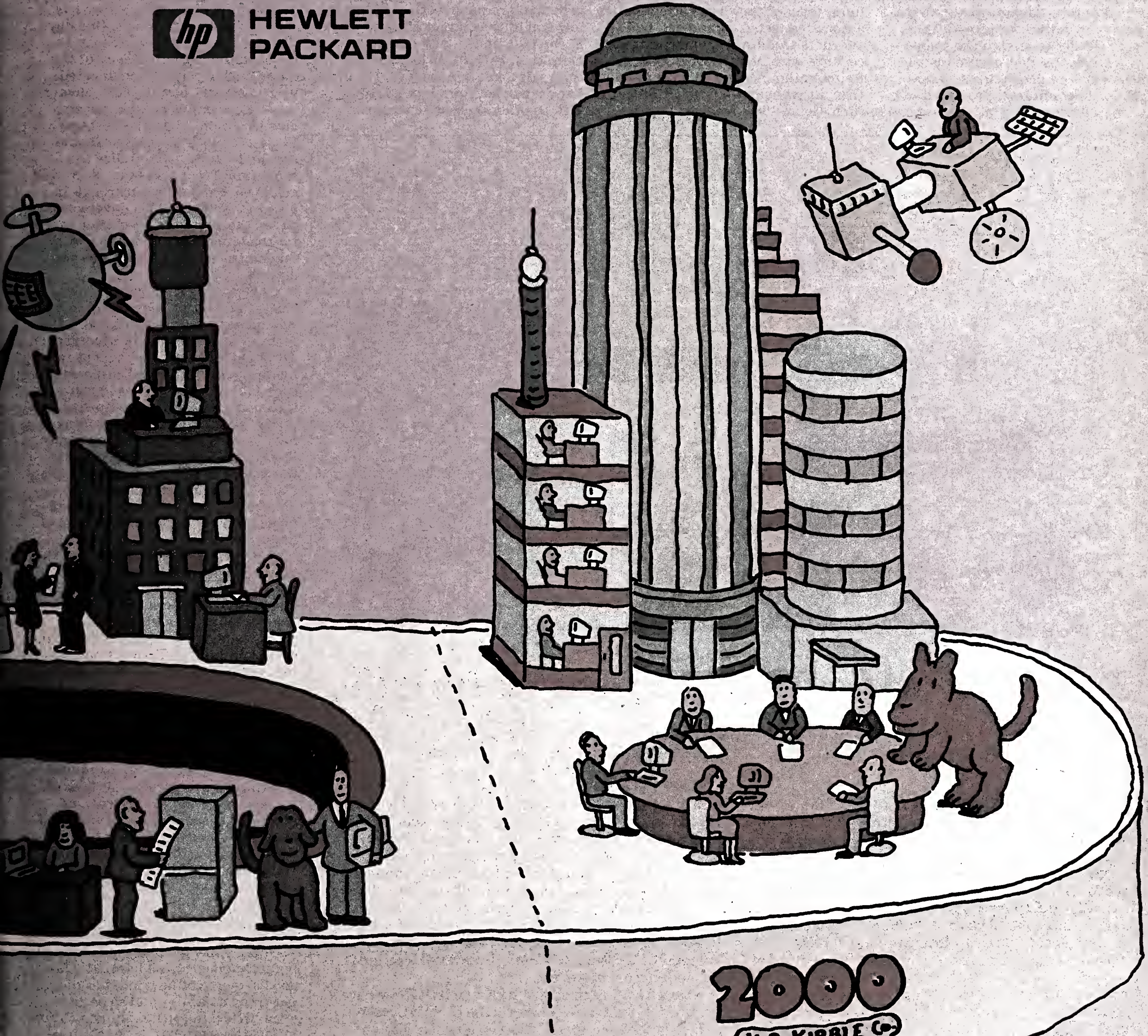

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take major and rapid change when necessary. Concentration, in short, does not mean stagnation.

The cost of strategic stagnation can be great, as General Radio found out. Once the leader of the electronic instruments business, General Radio almost single-handedly created many sectors of the market. Its engineering excellence and its progressive human relations policies were models for the industry. But when its founder, Melville Eastham, retired in 1950, General Radio's strategy ossified. In the next two decades, the company failed to take advantage of two major opportunities for growth that were closely related to the company's strengths: microwave instruments and minicomputers. Meanwhile, its traditional product line withered away. Now all that remains of General Radio's once dominant instruments line, which is less than 10% of sales, is a small assembly area where a handful of technicians assemble batches of the old instruments.

It wasn't until William Thurston, in the wake of mounting losses, assumed the presidency at the end of 1972 that the company began to refocus its engineering creativity and couple it to its new marketing strategies. Using the failure of the old policies as his mandate, Thurston deemphasized the aging product lines, focused the firm's attention on automated tested equipment, balanced its traditional engineering excellence with an increased sensitivity to market needs and gave the firm a new name — Genrad. Since then, Genrad has resumed rapid growth and has won a leadership position in the automatic test equipment market.

The Genrad story is a classic example of a firm making a strategic change because it perceived that its existing strategy was not working. But even successful high-technology firms sometimes feel the need to be rejuvenated periodically to avoid technological stagnation. In the mid-1960s, for example, IBM appeared to have little reason for major change. The company had a near monopoly in the mainframe industry. Its two principal products — the 1401 at the low end of the market and the 7090 at the high end — accounted for more than two-thirds of its industry's sales. Yet in one move, the company made both product lines (as well as others) obsolete and redefined the rules of competition for decades to come by simultaneously introducing six compatible models of the 360, based on proprietary hybrid integrated circuits.

During the same period, General Motors Corp., whose dominance of the U.S. auto industry approached IBM's position in the computer mainframe industry, stoutly resisted such a rejuvenation. Instead, it became more and more centralized and inflexible. Yet GM was also once a high-technology company. In its early days when Alfred P. Sloan ran the company, engines were viewed as high-technology products. One day, Charles F. Kettering told Sloan he believed the high efficiency of the diesel engine could be engineered into a compact power plant. Sloan's response was: "Very well, we are now in the diesel engine business. You tell us how the engine should run, and I will . . . capitalize the program." Two years later, Kettering achieved a major breakthrough in diesel technology. This development paved the way for a revolution in the railroad industry and led to GM's preeminence in the diesel locomotive markets.

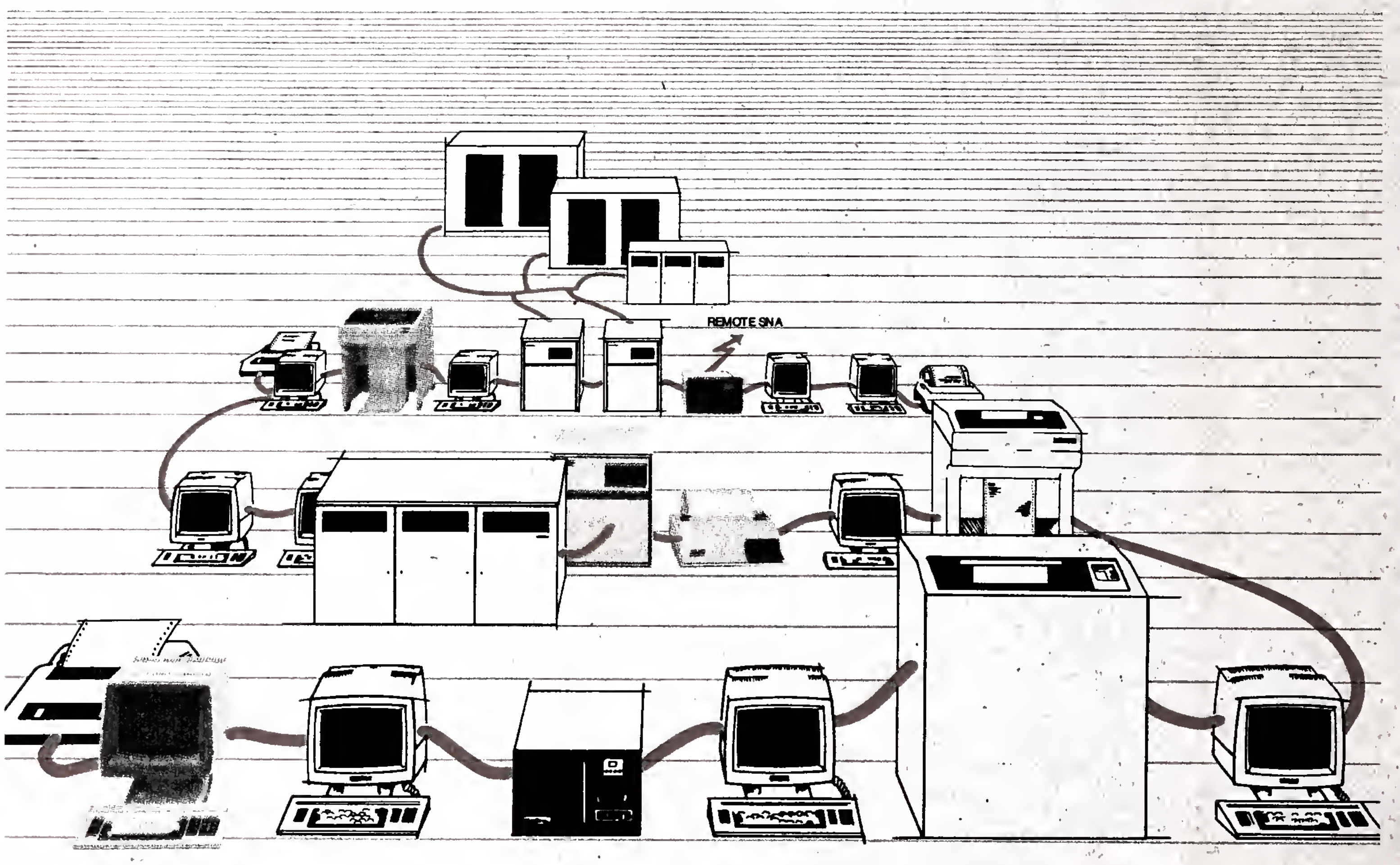
Undertaking such wrenching shifts in direction requires both agility and daring. Organizational agility seems to be associated with organizational flexibility — frequent realignments of people and responsibilities as the firm attempts to maintain its balance on shifting competitive sands. The daring and the willingness to take "you bet your company" kinds of risks is a product of both the inner confidence of its members and a powerful top management — one that either has effective shareholder control or the full support of its board.

3. Organizational cohesion. The key to success for a high-tech firm is not simply periodic renewal. There must also be cooperation in the translation of new ideas into new products and processes. As Ken Fisher, the architect of Prime Computer, Inc.'s extraordinary growth, put it, "If you have the driving function, the most important success factor is the ability to integrate. It's also the most difficult part of the task."

The energy and creativity of the whole organization must be tapped. Anything that restricts the flow of ideas or undermines the trust, respect and sense of a commonality of purpose among individuals is a potential danger. High-tech firms fight vigorously against the usual organizational accoutrements of seniority, rank and functional specialization. Little attention is given to organizational charts; often they don't exist.

Younger people in a rapidly evolving technological field are often as good a source of new ideas as older participants are — and sometimes even better. In some high-tech firms, in fact, the notion of a "half-life of knowledge" is used — that is, the amount of time that has to elapse before half of what one knows is obsolete. In semiconductor engineering, for example, it is estimated that the half-life of a newly minted Ph.D. is about seven years. Therefore, any practice that relegates younger engineers to secondary, nonpartnership roles is considered counterproductive.

Similarly, product design, marketing and manufacturing personnel must collaborate in a common cause rather than compete with one



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another, as happens in many organizations. Any policies that appear to elevate one of these functions above the others — either in prestige or in rewards — can poison the atmosphere for collaboration and cooperation.

The executive perks in many mature organizations are sources of division that distract the attention of people from the needs of the firm to their own aggrandizement. Pretentious job titles, separate dining rooms and restrooms for executives, larger and more luxurious offices (often separated in some way from the rest of the organization) and even separate or reserved places in the company parking lot all tend to establish "distance" between managers and doers and substitute artificial goals for the crucial real ones of creating successful new products and customers. The appearance of an executive dining room, in fact, is one of the clearest danger signals.

Good communication. One way to combat the development of such distance is by making top executives more visible and accessible. IBM, for instance, has an open-door policy that encourages managers at different levels of the organization to talk to department heads and vice-presidents. According to senior IBM executives, it was not unusual for a project manager to drop in and talk to Frank Cary (former IBM chairman) or John Opel (former president, now chairman) until Cary's recent retirement. Likewise, an office with transparent walls and no door, such as that of John Young, CEO at HP, encourages communication. In fact, open-style offices are common in many high-tech firms.

A regular feature of 3M Co.'s management process is the monthly technical forum where technical staff members from the firm exchange views on their projects. This emphasis on communication is not restricted to internal operations. The firm supports and often sponsors industrywide technical conferences, sabbaticals for staff members and cooperative projects with technical universities.

Technical forums serve to compensate partially for the loss of visibility technologists usually experience when an organization becomes more complex and when production, marketing and finance staffs swell. So does the concept of the dual-career ladder that is used in most of these firms (that is, a job hierarchy through which technical personnel can attain the status, compensation and recognition that is accorded to a division general manager or a corporate vice-president). By using this strategy, companies try to retain the spirit of the early days of the industry when scientists played a dominant role, often serving as members of the board of directors.

Job rotation. A policy of conscious job rotation also facilitates a sense of communality. In the small firm, everyone is involved in everyone else's job: Specialization tends to creep in as size increases and boundary lines between functions appear. If left unchecked, these boundaries can become rigid and impermeable. Rotating managers in temporary assignments across these boundaries helps keep the lines fluid and informal, however. When a new process is developed at TI, for example, the process developers are sent to the production unit where the process will be implemented.

> *If left unchecked, boundary lines between functions can become rigid and impermeable. Rotating managers in temporary assignments across these boundaries helps keep the lines fluid and informal.*

They are allowed to return to their usual posts only after that unit's operations manager is convinced that the process is working properly.

Integration of roles. Another way in which high-tech companies try to prevent organizational, and particularly hierarchical, barriers from rising is through multidisciplinary project teams, "special venture groups" and matrix-like organizational structures. Such structures, which require functional specialists and product/market managers to interact in a variety of relatively short-term problem-solving assignments, both inject a certain ambiguity into organizational relationships and require each individual to play various organizational roles.

For example, AT&T uses a combination of organizational and physical mechanisms to promote integration. The advanced development sections of Bell Laboratories are located at the former Western Electric plants.

This location creates an organizational bond between development and Bell's basic research and an equally important spatial bond between development and the manufacturing engineering groups at the plants. In this way, communication is encouraged among development and the other two groups.

Long-term employment. Long-term employment and intensive training are also important integrative mechanisms. Managers and technologists are more likely to develop satisfactory working relationships if they know they will be harnessed to each other for a good part of their working lives. Moreover, their loyalty and commitment to the firm are

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increased if they know the firm is continuously investing in upgrading their capabilities.

At Tandem Computers, Inc., technologists regularly train administrators on the performance and function of the firm's products and, in turn, administrators train the technologists on personnel policies and financial operations.

4. ***Entrepreneurial culture.*** While continuously striving to pull the organization together, successful high-tech firms also display fierce activism in promoting internal agents of change.

Indeed, the ease with which small entrepreneurial firms innovate has always inspired a mixture of puzzlement and jealousy in larger firms. When new ventures and small firms fail, capital shortages and managerial errors are usually to blame. Nonetheless, time and again they develop remarkably innovative products, processes and services with a speed and efficiency that baffle the managers of large companies. The Apple II, which created a new industry, and Genentech's genetically engineered insulin are of this genre. The explanation for a small entrepreneurial firm's innovativeness is straightforward, yet it is difficult for a large firm to replicate its spirit.

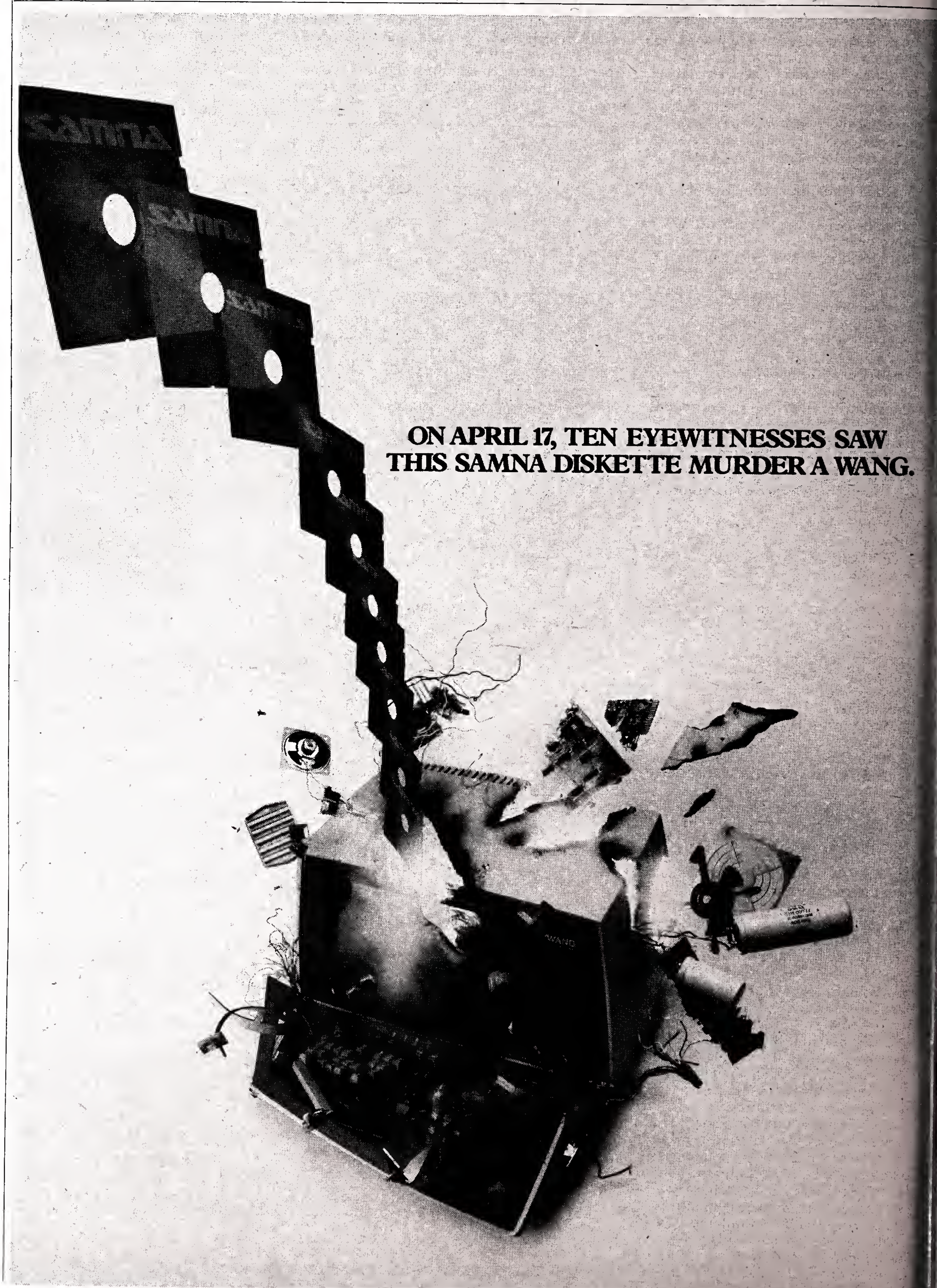
Entrepreneurial characteristics. First, the small firm is typically blessed with excellent communication. Its technical people are in continuous contact (and often in cramped quarters). They have lunch together, and they call each other outside of working hours. They come to understand and appreciate the difficulties and challenges facing one another. Sometimes they will change jobs or double up to break a critical bottleneck; often the same person plays multiple roles. This overlapping of responsibilities results in a second blessing: a dissolving of the classic organizational barriers that are major impediments to the innovating process.

Third, key decisions can be made immediately by the people who first recognize a problem, not later by top management or by someone who barely understands the issue. Fourth, the concentration of power in the leader/entrepreneurs makes it possible to deploy the firm's resources very rapidly. Finally, the small firm has access to multiple funding channels, from the family dentist to a formal public offering. In contrast, the manager of an R&D project in a large firm has effectively only one source, the "corporate bank."

Small divisions. In order to re-create the entrepreneurial climate of the small firm, successful large high-tech firms often employ a variety of organizational devices and personnel policies. First, they divide and subdivide. HP, for example, is made up of 50 divisions. The company has a policy of splitting divisions soon after they exceed 1,000 employees. TI is subdivided into more than 30 divisions and 250 "tactical action programs." Until recently, 3M's business was split into 40 divisions. Although these divisions sometimes reach $100 million or more in sales, by Fortune 500 standards they are still relatively small companies.

Variety of funding channels. Second, such high-tech firms employ a variety of funding channels to encourage risk taking. At TI, managers have three distinct options in funding a new R&D project: If their proposal is rejected by the centralized Strategic Planning (OST) System because it is not expected to yield acceptable economic gains, they can seek a Wild Hare grant. The Wild Hare program was instituted by Patrick Haggerty, while he was TI's chairman, to ensure that good ideas with long-term potential were not systematically turned down. Alternatively, if the project is outside the mainstream of the OST System, managers or engineers can contact one of dozens of individuals who hold Idea grant purse strings and who can authorize up to $25,000 for prototype development. It was an Idea grant that resulted in TI's highly successful Speak and Spell learning aid.

3M managers also have three choices: They can request funds from their own division, corporate R&D or the new ventures division. This willingness to allow a variety of funding channels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has an important consequence. It encourages the pursuit of alternative technological approaches, particularly during the early stages of a technology's development, when no one can be sure of the best course to follow.

IBM, for instance, has found that rebellion can be good business. Arthur K. Watson, the founder's son and a longtime senior manager, once described the way the disk memory was developed: "[It was] not the logical outcome of a decision made by IBM management; [because of budget difficulties] it was developed in one of our laboratories as a bootleg project. A handful of men . . . broke the rules. They risked their jobs to work on a project they believed in."

Tolerance of failure. Moreover, the successful high-technology firms tend to be very tolerant of technological failure. At HP, according to Bob Hungate, general manager of the Medical Supplies Division, "It's understood that when you try something new you will sometimes fail." Similarly, at 3M, those who fail to turn their pet project into a commercial success almost always get another chance. Richard Frankel, the president of the Kevex Corp., a $20 million instrument manufacturer, once put it this way: "You need to encourage people to make mistakes. You have to let them fly in spite of aerodynamic limitations."

Opportunity to pursue outside projects. Finally, these firms provide ample time to pursue speculative projects. Typically, as much as 20% of a productive scientist's or engineer's time is "unprogrammed," during which he is free to pursue interests that may not lie in the mainstream of the firm. IBM Technical Fellows are given up to five years to work on projects of their own choosing, from high-speed memories to astronomy.

5. Sense of integrity. While committed to individualism and entrepreneurship, at the same time successful firms tend to exhibit a commitment to long-term relationships. The firms view themselves as part of an enduring community that includes employees, stockholders, customers, suppliers and local communities. Their objective is to maintain stable associations with all of these interest groups.

Although these firms have clear-cut objectives regarding growth, profits and market share, they consider them subordinate to higher order ethical values. Honesty, fairness and openness — that is, integrity — are not to be sacrificed for short-term gain. Such companies do not knowingly promise what they cannot deliver to customers, stockholders or employees. They do not misrepresent company plans and performance. They tend to be tough but forthright competitors.

Herb Dwight, president of laser manufacturer Spectra-Physics, once said, "The managers who succeed here go out of their way to be ethical." And Alexander d'Arbeloff, co-founder and president of Teradyne, has stated bluntly, "Integrity comes first. If you don't have that, nothing else matters."

These policies may seem utopian, even puritanical, but in a high-tech firm they also make good business sense. Technological change can be dazzlingly rapid; therefore, uncertainty is high, risks are difficult to assess and market opportunities and profits are hard to predict. It is almost impossible to get a complex product into production, for example, without solid trust between functions, between workers and managers and between managers and stockholders (who must be willing to see the company through the possible dips in sales growth and earnings that often accompany major technological shifts).

Self-understanding. This sense of integrity manifests itself in a second, not unrelated, way — self-understanding. The pride, almost arrogance, of these firms in their ability to compete in their chosen fields is tempered by a surprising acknowledgment of their limitations. One has only to read HP's corporate objectives or interview one of its top managers to sense this extraordinary blend of strength and humility. Successful high-tech companies are able to reconcile their "dream" with what they can realistically

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achieve. This is one of the reasons they are reluctant to diversify into unknown territories.

6. "Hands-on" top management. Notwithstanding their deep sense of respect and trust for individuals, CEOs of successful high-tech firms are usually actively involved in the innovation process to such an extent that they are sometimes accused of meddling. Tom MacAvoy, president of Corning Glass Works, sifts through hundreds of project proposals each year trying to identify those that can have a "significant strategic impact on the company" — the potential to restructure the company's business.

Not surprisingly, most of these projects deal with new technologies. For one or two of the most salient ones, he adopts the role of "field general." He frequently visits the line operations, receives direct updates from those working on the project and assures himself that the required resources are being provided.

> *Good high-tech managers not only understand how organizations and, in particular, engineers work, they understand the fundamentals of their technology and can interact directly with their people about it.*

Similar patterns can be identified in many larger high-technology firms. Milt Greenberg, president of GCA, a $180 million semiconductor process equipment manufacturer, stated: "Sometimes you just have to short-circuit the organization to achieve major change." Tom Watson Jr. and Vince Learson were doing just that when they met with programmers and designers and other executives in Watson's ski cabin in Vermont to finalize software design concepts for the IBM 360 — at a point in time when IBM was already a $4 billion firm.

Good high-tech managers not only understand how organizations and, in particular, engineers work, they understand the fundamentals of their technology and can interact directly with their people about it. This does not imply that it is necessary for the senior managers of such firms to be technologists (although they usually are in the early stages of growth); neither Watson nor Learson were technical people. What appears to be more important are the ability to ask lots of questions, even "dumb" questions, and dogged patience in order to understand in depth such core questions as: 1) how the technology works; 2) its limits, as well as its potential (together with the limits and potential of competitors' technologies); 3) what the various technologies require in terms of technical and economic resources; 4) the direction and speed of change; and 5) the available technological options, their cost, probability of failure and potential benefits if they prove successful.

Paradox of management

The six themes around which we arranged our findings can be organized into two apparently paradoxical groupings: business focus, organizational cohesion and a sense of integrity fall into one group; adaptability, entrepreneurial culture and hands-on management fall into the other.

On the one hand, business focus, organizational cohesion and integrity imply stability and conservatism. On the other hand, adaptability, entrepreneurial culture and hands-on top management are synonymous with rapid, sometimes precipitous change. The fundamental tension is between order and disorder. Half of the success factors pull in one direction; the other half tug the other way.

Not only do formal organizations resist innovation, they often act in ways that stamp it out. Overcoming such behavior — which is analogous to the way the human body mobilizes antibodies to attack foreign cells — is, therefore, a core job of high-tech management.

High-tech firms deal with this challenge in different ways. TI, long renowned for the complex, interdependent matrix structure it used in managing dozens of product-customer centers (PCC), recently consolidated groups of PCCs and made them into more autonomous units. "The manager of a PCC controls the resources and operations for his entire family. . . . In the simplest terms, the PCC manager is to be an entrepreneur," explained Fred Bucy, TI's president.

Meanwhile, a different trend is evident at 3M, where entrepreneurs have been given a free rein for decades. A recent major reorganization was designed to arrest snowballing diversity by concentrating the company's sprawling structure of autonomous divisions into four market groups. "We were becoming too fragmented," explained Vincent Ruane, vice-president of 3M's electronics division.

Similarly, HP recently reorganized into five groups, each with its own strategic responsibilities. Although this reorganization simply changes some of its reporting relationships, it does give HP, for the first time, a means for integrating product and market development across generally autonomous units.

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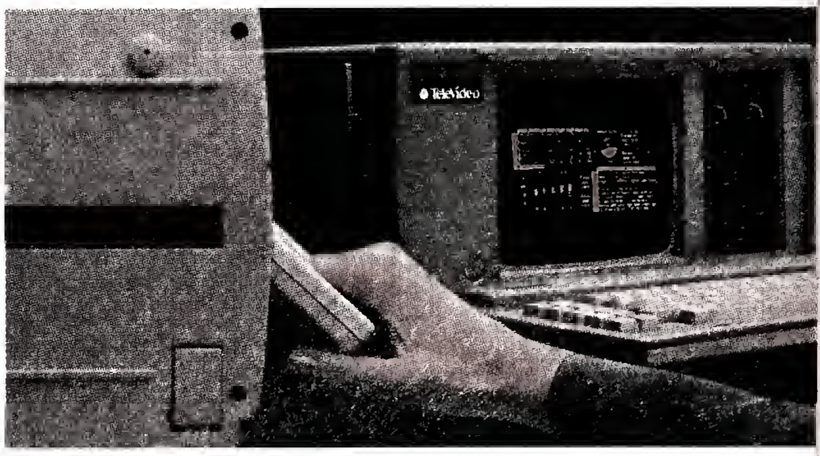

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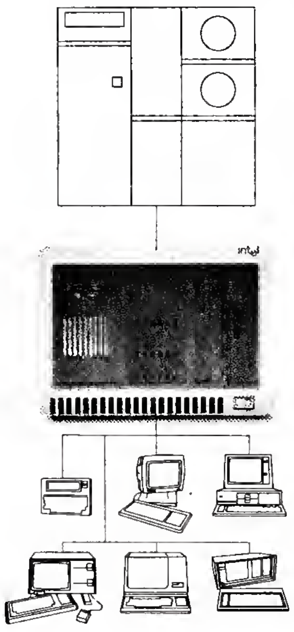

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mean that organizational integration is dead at TI or that 3M's and HP's entrepreneurial cultures are being dismantled. They signify first that these firms recognize that both organizational integration and entrepreneurial cultures are important and, second, that periodic change is required for environmental adaptability. These three firms are demonstrating remarkable adaptability by reorganizing from a position of relative strength — not, as is far more common, in response to financial difficulties. Lewis Lehr, 3M president, explained, "We can change now because we're not in trouble."

Such reversals are essentially antibureaucratic, in the same spirit as Mao's admonition to "let a hundred flowers blossom and a hundred schools of thought contend." At IBM in 1963, Tom Watson Jr. temporarily abolished the corporate management committee in an attempt to push decisions downward and thus facilitate the changes necessary for IBM's great leap forward to the 360. Disorder, slack and ambiguity are necessary for innovation, since they provide the porosity that facilitates entrepreneurial behavior — just as do geographically separated, relatively autonomous organizational subunits.

But the corporate management committee is alive and well at IBM today, as it should be. The process of innovation, once begun, is both self-perpetuating and potentially self-destructive. Although the top managers of high-tech firms must sometimes espouse organizational disorder, for the most part they must preserve order.

Winnowing old products

Just as the long-term success of the firm requires the planting and nurturing of new products, it also requires the conscious, even ruthless, pruning of other products so that the resources they consume can be used elsewhere.

This requirement demands hard-nosed leaders who are continually managing the functional and divisional interfaces of their firms. They cannot be swayed by nostalgia or by the fear of disappointing the many committed people who are involved in the development and production of discontinued products. They must also overcome the natural resistance of their subordinates and even their peers, who often have a vested interest in the products that brought them early personal success in the organization.

Yet firms also need a certain amount of continuity because major change often emerges from the accretion of a number of smaller, less visible improvements.

Indeed, most engineers, managers, technologists and manufacturing and marketing specialists work on what Thomas Kuhn might have called "normal innovation," the little steps that improve or extend existing product lines and processes.

Managing ambivalently

The successful high-technology firm, then, must be managed ambivalently. A steady commitment to order and organization will produce one-color Model T Fords. Continuous revolution will bar incremental productivity gains. Many companies have found that alternating periods of relaxation and control appear to meet this dual need. Surprisingly, such ambiguity does not necessarily lead to frustration and discontent. In fact, interspersing periods of tension, action and excitement with periods of reflection, evaluation and revitalization creates the same sort of irregular rhythm that characterizes many popular pastimes — including sailing, which has been described as "long periods of total boredom punctuated with moments of stark terror."

Knowing when and where to change from one stance to the other and having the power to make the shift are the core of the art of high-technology management. James E. Webb, administrator of the National Aeronautics and Space Administration during the Apollo program, recalled, "We were required to fly our administrative machine in a turbulent environment, and . . . a certain level of organizational instability was essential if Nasa was not to lose control."

In summary, the central dilemma of the high-technology firm is that it must succeed in managing two conflicting trends: continuity and rapid change. There are two ways to resolve this dilemma. One is an old idea: managing different parts of the firm differently — some business units for innovation, others for efficiency.

A second way — a way we believe is more powerful and pervasive — is to manage differently at different times in the evolutionary cycle of the firm. The successful high-technology firm *alternates* periods of consolidation and continuity with sharp reorientations that can lead to dramatic changes in the firm's strategies, structure, controls and distribution of power. Thomas Jefferson knew this secret when he wrote 200 years ago, "A little revolution now and then is a good thing."

About the authors

Modesto Maidique is associate professor of engineering management at Stanford University. His teaching and research interests center on the management of the technological firm.

Robert Hayes is professor of business administration at the Graduate School of Business Administration at Harvard University. He is the author of Restoring Our Competitive Edge: Competing Through Manufacturing, *to be published by John Wiley & Sons.‡*

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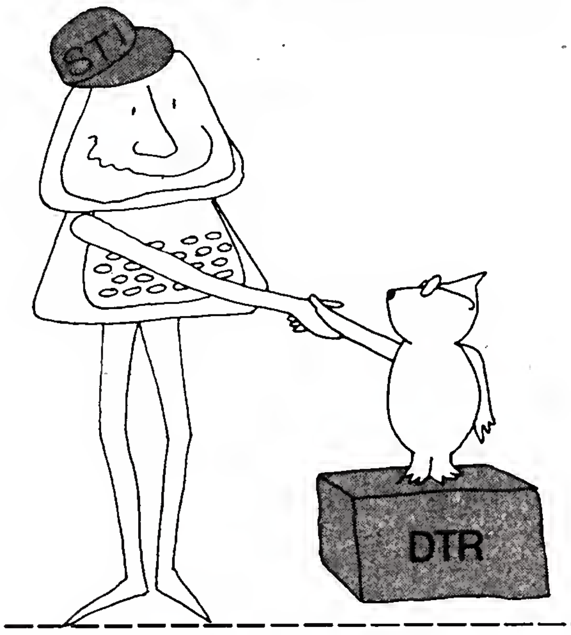

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EDITORIAL

Its illness was terminal

In abandoning the data processing business, Raytheon Co. apparently hit on a sobering reality: It's much easier to do business with the government, especially the U.S. Department of Defense, than it is to fight it out in markets that are truly competitive.

The Raytheon Data Systems division was a relatively small cog ($307 million in 1983 sales) in the parent company's $6 billion machinery. But it demonstrated a decided bent for losing money — more than $24 million last year and more than $6 million in the first four months of this year. And while it was the largest manufacturer of IBM 3270-compatible terminals, with an installed base of some 200,000 machines, the division was unable to expand from that base.

What happened?

There is no question that the terminal business, particularly the 3270 end, is one of the most fiercely competitive niches in the data processing market. Raytheon spokesmen conceded that IBM's recent revamping of the 3270, coupled with price reductions in that product line, made the competition even keener. A report from International Data Corp. in Framingham, Mass., last year predicted that 3270 prices would decline from more than $2,000 to under $1,500 within three years.

There is no question, too, that price competition is making terminal assembly an increasingly difficult proposition for onshore manufacturers like Raytheon. Two-thirds of Data Systems' employees work in the U.S., most in Massachusetts, where wages are among the highest in the nation.

But there are other indications that the division, in recent years anyway, got diminishing support from its parent, which has grown fat eating at the Defense Department trough — oftentimes as a single-source supplier of components for strategic weapons systems. According to sources, certain Data Systems budgets, including product advertising, were slashed or frozen in recent months, at a time when competition was heating to the flash point.

Now the parent is retreating from the world of competition to the sanctity of defense work, where bad decisions can magically become government-funded cost overruns, and one does not have to be especially efficient to make money. Raytheon will be much happier there — unless IBM decides to get into the missile business.

PDQ Corp. says it'll match Megabit Ltd.'s pair of season tickets to the women's mud-wrestling matches and throw in a year's free dry cleaning for your designer jogging sweatsuit!

LETTERS

IBM System/38 vs. 360, 370, 4300: radical difference in technology

"The System/38: An architecture not to be ignored" and "System/38 earns tag 'least understood processor' " [CW, April 30], specifically, were interesting, but only begin to scratch the surface of a machine as radically different from IBM 360, 370 and 4300 series technology as the personal computer is to the IBM 029 card punch.

Example: 48-bit addressing yields single-level storage of 281 trillion bytes. Compare that with the 16M-byte limit imposed by a 24-bit scheme. Ask yourself how many 3380s that is. Even 31 bits yield a mere 2 billion bytes or so.

Example: Data base support, as part of the inherent operating system/microcode/hardware function, that essentially eliminates sorts, via support of immediate (if desired) maintenance of all access paths to both physical and logical views of data in the system. This is not software "on top of" operating system software. It comes with the box.

Example: Implementation of RPG-III, which now lends itself to much more structured coding techniques and completely frees the programmer from the old RPG I/O and logic cycle. Add support of Cobol, of course, and Basic for good measure.

As to the question, "Can IBM wean users from outmoded 370?" [CW, April 30], who cares? Let those who so desire continue to pay for data base administrators, CICS programmers, operating system gurus, communications hot-shots and staffs of many. In the System/38, my company has a box that will support its needs with minimal staff addition and conversion disruption for quite some time to come. We will be doing on-line, transaction-driven, real-time, user-oriented "1980s-style computing" through the 1980s.

While we are moving from the System/34, we

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VIEWPOINT

How to tell if your DBMS venture will be successful

THE DATA CENTER
John P. Murray

This is the second in an eight-part series.

One consideration that is often overlooked (perhaps ignored would be a more appropriate word) in the development of a data base management system (DBMS) environment is that of determining the relative success of the venture. Unless some criteria are developed against which to judge the result of the DBMS, an objective analysis of the effort will prove elusive.

Two areas should be given attention in choosing criteria for evaluating the DBMS results. These issues are:

- What criteria should be established as a basis for judging the relative success of the DBMS?
- Why is the development of such criteria important?

To address the last question first, development of meaningful DBMS criteria serves to establish standards by which the results of the DBMS will be judged. Without a set of recognized goals against which the DBMS progress can be measured, the effort will tend either to languish or to drift in an uncontrolled fashion. Absent a set of meaningful criteria that can provide direction and control, there is a tendency to chase after every client or MIS DBMS proposal or whim. To succeed, the DBMS general plan must be set and adhered to, come what may. Therefore, the plan must be good, and it must be based on strong, sound criteria.

What of the criteria themselves? The first issue to consider is not the selection of a particular DBMS, but the ultimate business purposes that are to be served by the DBMS. The answer, of course, will be different in various organizations. Keep in mind that, to be successful, the DBMS installation must serve to advance the business, not the technical aspirations of the MIS department. Therefore, the salient DBMS criteria must be: What will it do for the business? The technical considerations should then follow.

The real potential to change an organization (for good or ill) rests with the DBMS. By itself, the DBMS is by no means a panacea. In fact, the selection of a poor DBMS, or the failure to manage the DBMS correctly, even a good one, will at best mean a number of lost opportunities for the organization; at worst, it can produce grevious consequences. The clearer the vision of the business use of the DBMS, the better will be the chance for the eventual success, not only of the DBMS, but of the entire enterprise.

Objectives of the DBMS

A general statement about the objectives of the DBMS, in terms of its use for the business, might be, "to provide all MIS clients with the ability to access the organization's data quickly and easily, and through the use of that data, enable clients to develop programs and produce their own information outside the constraints of the MIS department. The goal of the DBMS process will be, insofar as is practical, to capture all the organization's data, one time at the source, and then make that data available throughout the organization. The purpose of the development of the DBMS environment is to provide a vehicle to manage the organization better."

If that is a reasonable, if perhaps concise, expression of the DBMS objective, a number of specific issues can then be posed based upon that premise. Some of those issues would include:

- Is all the organization's data, within practical limits, to be placed under the DBMS?
- How do we map out a plan to reduce and control redundant data? (When we began our DBMS project and began to realize how much redundant data we had accumulated over the years, I was convinced all redundancy was evil and should be rooted out. Today, I am comfortable with the concept of some controlled redundancy within the DBMS environment.)
- Do we wish to encourage the greatest possible use of the DBMS facilities and the fourth-generation programming language by MIS clients? If so, are we willing to face up to the issue of the requirement for large and expanding hardware facilities to support that use?
- How will the data be structured within the data base?
- Who will determine those structures and decide what are the most appropriate design criteria under the DBMS?
- Are we willing to move from a Cobol to a fourth-generation programming milieu in the MIS department? Are we willing, at some given point in time, to restrict the use of Cobol severely?
- Are we willing to provide the required training to support the DBMS in both the MIS and client areas?
- Will MIS make the required marketing effort to sell the DBMS concept and the use of fourth-generation programming languages within the organization?
- Is MIS management willing to develop and enforce the disciplines and the fortitude required both to support and to fight for the benefits of the DBMS over the long haul?
- Are both MIS management and senior management aware of the real issues involved in the building of a DBMS environment that will support the stated objectives of the business purpose of the DBMS?

So, it follows that once a concept of the DBMS' role has been identified, the next step is to consider the individual criteria that affect the success of that concept.

What is the value of all this? It sounds like a great deal of work. Building an effective DBMS environment is a massive task. The value of defining DBMS goals and criteria is that it forces people to raise and consider the real DBMS issues before the DBMS environment has become entrenched. Speaking impartially, I can state that it is much better to understand and address these issues in the beginning than to be faced with them (as we were and are) as the DBMS environment builds.

Once the criteria have been determined, they can then be incorporated into the overall DBMS

See **DBMS** page 66

Murray is director of management information services for Rayovac Corp., Madison, Wis., and author of Management Information Systems as a Corporate Resource, *published by Dow Jones-Irwin.*

Portables link personal with professional goals

HUMAN CONNECTION
Jack Stone

After nearly three decades of frustration in dealing with centralized business systems and user-hostile terminals, all users have become aware of the beginnings of a new form of DP life. That life is organized around personal systems and user-friendly interfaces, and, according to users' perceptions, offers to liberate them from the bondage of the vast bureaucracies of computer departments.

One reason for the current ground swell of personal computer excitement in user camps is because the users view the micros as devices that can help them personally, as distinguished from helping the business. That is to say, users see the potential for these machines to enable them to perform better on the job, certainly by increasing *productivity*, but much more importantly, by increasing the *quality* of their output.

In other words, the astute go-getters in the operating departments have found a red-hot link between their abilities to handle a personal computer at the office and the advancement of their careers. Those knowledgeable, for example, in Lotus Development Corp.'s 1-2-3 plus Multimate Software Systems, Inc.'s Multimate or any similar system are flying jet streams toward their personal goals, as opposed to colleagues without the capability, who are trudging ahead on the treadmill, if not losing their competitive standing altogether.

Indeed, these days, if a center wants to heal the long-standing divisions that have separated it from the user population, it can establish in its user support group an individual to consult with the user departments on the acquisition, operation and support of personal computers. This one person can go a long way in building friendships anew and rekindling cooperative attitudes.

Best concept going

And if you haven't discovered it for yourself yet, be so advised that the portable personal computer is the best concept going, even though the ideal configuration is slightly down the proverbial pike. The notion of providing a company-paid personal computer for both den and office is a beauty, but dragging a 20- to 30-pound behemoth home every night on the subway sinks it, pure and simple. Far better to choose notebook-style laps for their high coefficient of carrying ease, with a feed to full-function desktops, as long as there is enough compute zing to handle specific jobs.

A round of applause for Tandy Corp., NEC Corp. and others for opening the doors to the laps, but the low-priced machines (under $1,000 and a teensie random-access memory [RAM]), though brilliant technological achievements (excepting the cloddish cassette tape drive), are too specialized for typical users, in my judgment, at least at this point in time. A better bet — if one can spring loose some additional greenbacks — are machines like Sharp Associate's new 5000 or, better still, Teleram Communications Corp.'s combined lap-style portable plus desktop station.

Teleram offers a system today that seems to exemplify the next generation of personal computers — a powerhouse portable that integrates into a powerhouse desktop. The company, which has made a reputation as a supplier of portable text editors for writers, offers a lap-style portable unit with 64K bytes of RAM. Mass storage for the machine is a fixed, nonvolatile bubble memory with a whopping 128K-byte capacity (upgradable to 256K bytes). Digital Research, Inc.'s CP/M is standard, UCSD P-system is optional and IBM Personal Computer disk formats are supported.

The lap-style portable plugs neatly into an office station, together making up the desktop configuration. The station houses a video monitor controller and provides attachments to one or more diskette drives. So the user downloads programs and data from floppy to the bubble, unplugs the portable and off he runs. Can you believe it? A CP/M machine driven by rechargeable battery or, in a pinch, from the cigar lighter in your car. ‡

Stone is an independent management consultant, educator and writer, specializing in DP human communications and personnel development, based in Washington, D.C.

Does MIS success hinge on the state of the art?

LETTERS

After reading John P. Murray's article "MIS and a state-of-the-art environment" [CW, April 9], I felt that a reply was necessary.

The greatest part of this article is spent suggesting methods to convince senior management to spend the considerable sums involved in moving to a state-of-the-art environment. Very little time is devoted to explaining exactly what a state-of-the-art environment actually is. Nor is any significant effort directed toward developing sound business reasons why a state-of-the-art environment is so critically needed.

I must assume, based on the first few paragraphs, that state of the art implies use of the latest hardware and software advances, including data base management systems (DBMS), fourth-generation languages and information centers. The actual meaning intended for state of the art is critical if the reader is to understand Murray's conclusion that "the eventual success or failure of [an] organization may rest upon the determination of [an] organization's MIS management to move to and then to maintain the state-of-the-art environment."

There are, of course, very many examples of data centers that would be considered behind the state of the art, yet are very successful in their function of supporting the corporate information processing requirements.

Disk units, a DBMS and an information center could help the MIS mission, of course, but should be installed only after sound business reasons have been developed.

I suggest that the true measure of success of an MIS organization lies in the degree of support provided to the attainment of corporate strategic and operational goals — not in the attainment of some nebulous measure of state-of-the-art technical advancements.

To provide such support effectively, the MIS director must naturally become part of the corporate management team. However, for this to happen, MIS people must be capable of acting as business managers, not as data processing technicians.

Undue emphasis upon the tools of our trade, rather than on the effective application of these tools, can only result in a less effective and less useful MIS organization.

These tools, as well as the more established ones, must be applied within a sound business plan after careful analysis of the organization's current and future information processing requirements.

Richard K. Fox
Data center manager
American International Group
Data Center, Inc.

DBMS from page 65

plan. As an example, what you want the DBMS to do will have an impact on the system you select and the approach you take in selling the plan to senior management. If the DBMS is to be installed and controlled by the technical support group, then issues such as the use of fourth-generation programming by MIS clients and client training are probably not particularly relevant.

Conversely, if the goal is to install the DBMS and build the best possible information environment for MIS clients and therefore the organization, those same issues are indeed salient. They should be recognized as such from the start.

Building the DBMS environment is no different, in terms of planning, from any other MIS project. The basics of project management apply here as surely as anywhere else. The key to success, just as with any MIS application project, is to have the clearest possible vision of the ultimate goals of the project prior to commencing.

Next: Guidelines to selecting and installing your DBMS.

LETTER from page 64

are not just converting to the System/38, but are in the very enviable position of complete reanalysis, redesign and total replacement of all existing systems to take full advantage of the System/38's state-of-the-art design and technology. It has been an interesting struggle to get the company's management to commit the necessary resources, but the probability is that if we don't do it now, we will have to do it later, at greater cost, from even more obsolete systems.

It is a dilemma, and we are, in a very real sense, fortunate to be small enough in size and large enough in thinking and fortitude to be able to forge ahead. There are others in my company's position, and I am certain they could benefit from more coverage of a system that offers a way out of the 370's architectural chasm.

Paul Alberts
Data processing manager
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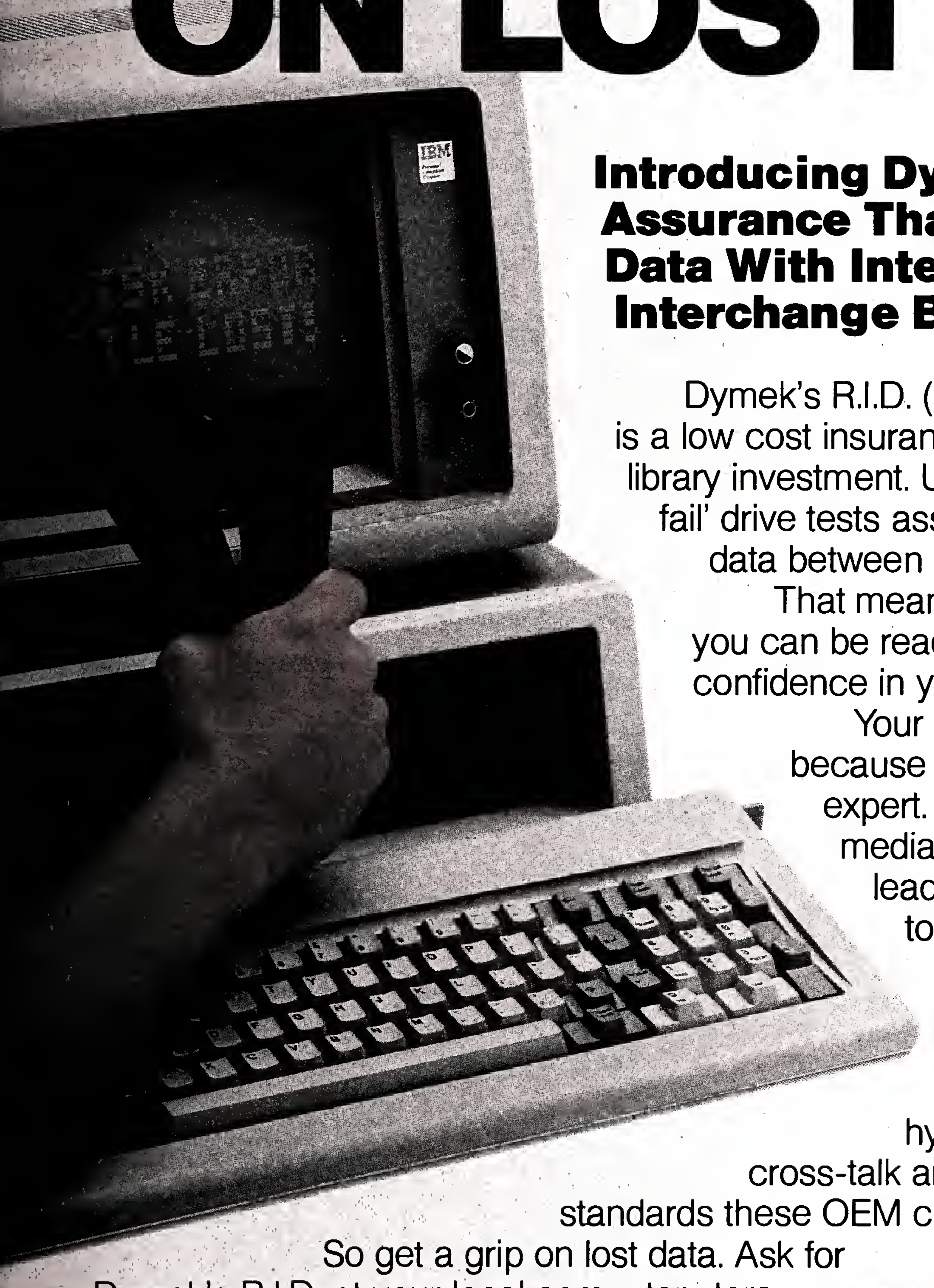

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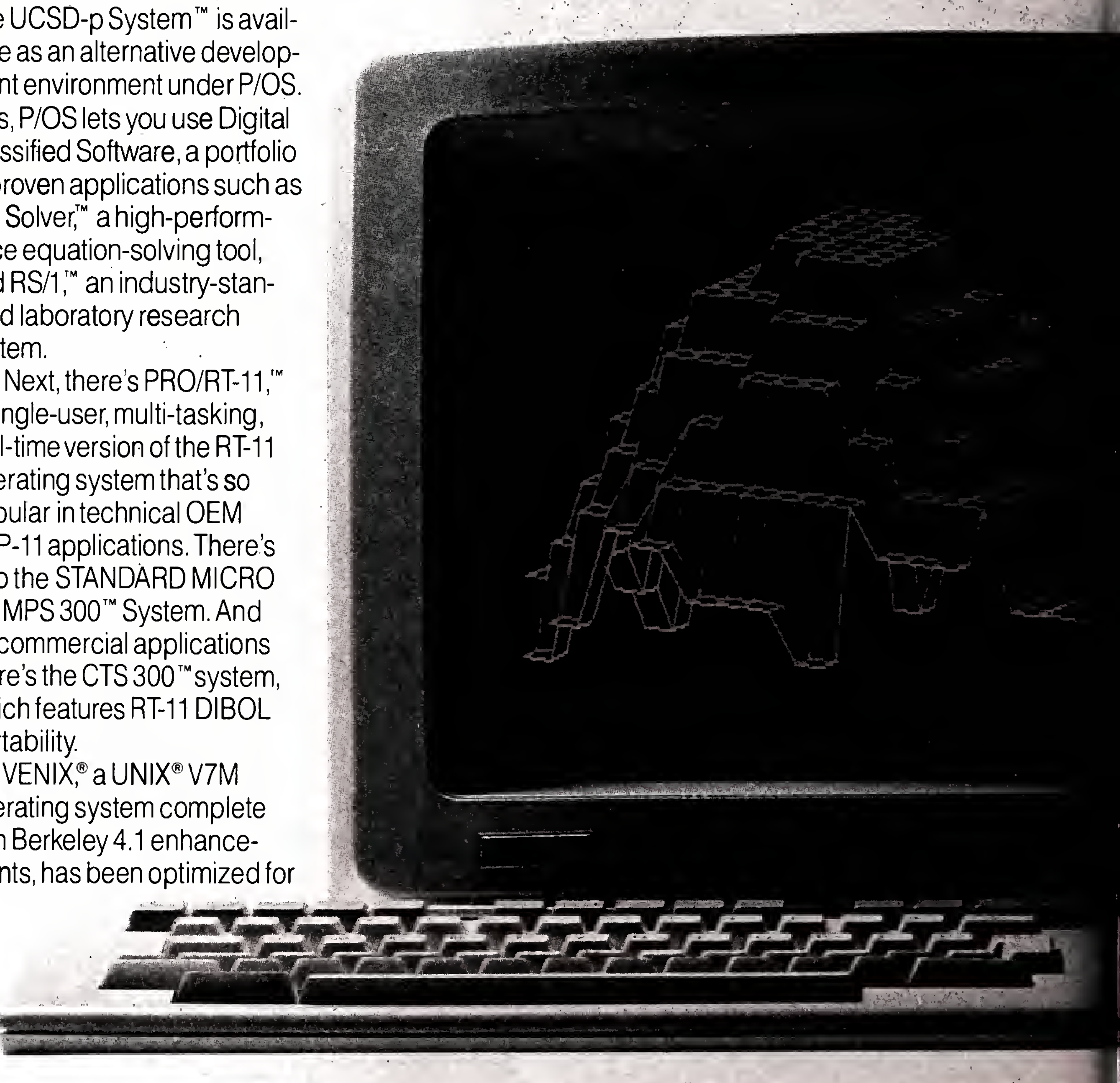

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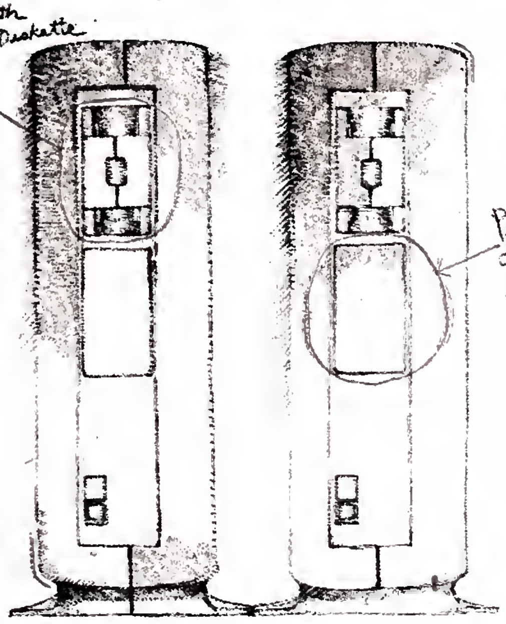

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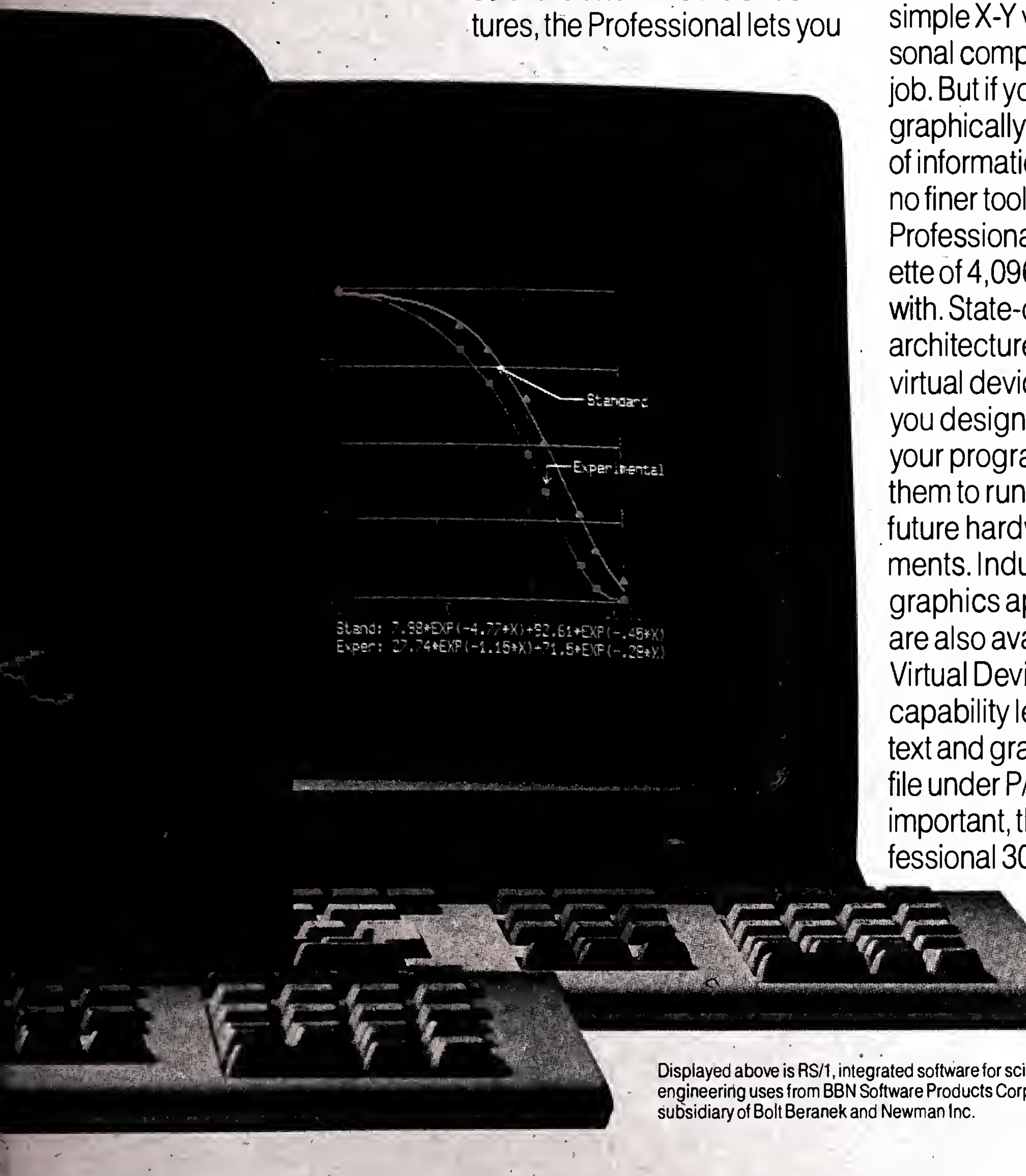
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For the whole story, call Zilog Systems Division at (800) 841-2255. Or write: Zilog Systems Division, Corporate Publications, 1315 Dell Avenue, MS C2-6, Campbell, CA 95008.

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SOFTWARE & SERVICES

Software, supplier choices critical to success

By Ray Dicasali
Special to CW‡.

Every year, software companies offering a variety of new systems enter the market. A few have become giants. Others have quietly disappeared. For those who are thinking of investing in computer systems applications for their operations, the health and survival of the software supplier they choose should be of fundamental importance.

Choosing the right software and software supplier is more critical, in many ways, than choosing the right computer hardware. The ramifications of the software choice will be felt every day in the operation of the company. The right choice is the most important step you will take in finding new solutions for old problems.

Following are some guidelines for deciding what is the right choice for you:

What's the problem?

First things first: What is the problem you want to solve with your software? You will want to make a comprehensive assessment of your company's needs. Determine where software can assist you now, as well as later, by accounting for future growth.

In making this review of your company, you should look at precisely how you do

See **CHOICE** page 80

Dicasali is vice-president of the Manufacturing Systems Division of Management Science America, Inc.

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SOFTLINE
Frank Sweet

Too many chiefs, one little Indian

Over coffee in the break room, a programmer/analyst tells the following sorrowful tale: "I've got seven people looking over my shoulder: one senior analyst, one project manager, a development center manager, an MIS director, two data base administrators and even the vice-president now and then. They all tell me that this system is 'critical' or 'vital' or 'politically important,' whatever that means. Well, if they're so worried I won't finish on time, how come nobody offers to pitch in and help me sling code? We have an army of chiefs breathing down my neck, but just one Indian doing the work — me."

See **INDIAN** page 79

Sweet has 14 years of data base experience. Currently, he is corporate manager of data administration for the Charter Co. in Jacksonville, Fla. He is a regular contributor to Softline.

Enhanced Focus IMS/DC Interface offered by Information Builders

NEW YORK — Information Builders, Inc. has announced Release 2.2 of its Focus IMS/DC Interface, which permits users of the company's Focus data base management system to execute reporting and data analysis functions against IBM's IMS data bases and other existing files.

According to a spokesman, those functions include ad hoc queries, formatted reporting, graphics, statistical analysis and financial modeling. IBM's IMS/DC environment reportedly allows multiple users to access a single copy of Focus in memory.

The spokesman said Release 2.2 features a full screen editor that allows information to be changed, recalled and saved for later execution. External data bases, including IBM's Isam, Vsam, DL/1 and Osam; Cincom Systems, Inc.'s Total; Software AG of North America, Inc.'s Adabas; and Cullinet Software, Inc.'s IDMS, can also be dynamically allocated.

The Focus IMS/DC Interface is priced at $8,500 or can be leased for $240 per month from Information Builders, 1250 Broadway, New York, N.Y. 10001.

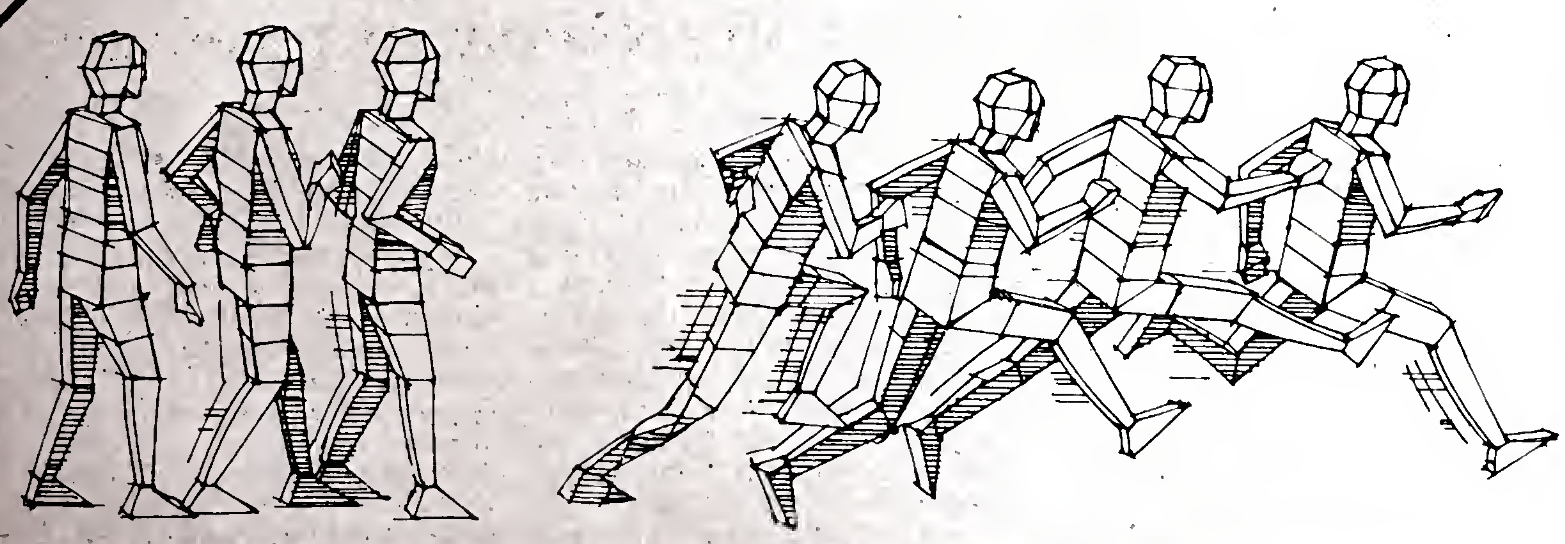
NBS establishes software guideline

SPRINGFIELD, Va. — The National Bureau of Standards (NBS) has released its first official guideline for the validation, verification and testing of software. The guideline is contained in a new Federal Information Processing Standards (Fips) publication that a staff member described as being a generic method for reducing the need to correct errors after software has been put into production.

The 37-page "Guideline for Life Cycle Validation, Verification and Testing of Computer Software" represents "the first time the total life cycle approach has been given [by NBS] as a framework for defining validation, verification and testing procedures," said Dolores R. Wallace, a computer scientist in the Systems and Software Technology Division of the NBS Institute for Computer Sciences and Technology in Washington, D.C. The document emphasizes that validation, verification and testing should be done throughout the development life cycle.

The report is basically "a background that can be tailored to individual projects," Wallace said. It offers a way to schedule development activities so that they take place concurrently with valida-

See **NBS** page 80



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Tell-A-Graf upgrade adjusts chart layout to display media

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — Integrated Software Systems Corp. (Issco) recently enhanced its Tell-A-Graf graphics package with a feature that is said to adjust automatically chart layouts to suit different display media.

At the same time, Issco also expanded support for the company's Disspla graphics system to include the recently announced AT&T 3B20 superminicomputer line running under Unix System V.

Both announcements came during the fifth annual conference of the National Computer Graphics Association.

The ability to tailor automatically graphics designs to suit different output media is implemented in Issco's latest Tell-A-Graf release, Version 5.0, according to a spokesman.

Issco's chart reformatting feature, dubbed Layout Intelligence, reportedly relieves graphics makers of the task of choosing the right visual design and color combination.

Under Tell-A-Graf 5.0, users need only specify the type of medium in which they want their planned charts to appear — slides, viewgraphs, CRT terminals, reports or microcomputers. Layout Intelligence then automatically designs, formats and colors the graphs in accordance with the designated medium's requirements, the spokesman said.

The latest Tell-A-Graf release also incorporates several other enhancements, including:

- A feature that provides chart makers with an unlimited color selection.
- A metafile retrieval capability that merges stored Tell-A-Graf and Disspla graphics to replace text or to form symbols and curves.
- Software refinements that support curve and area blanking and allow users to create high-low-close stock charts, error bars and other graphs.

Under Issco's support policy, Version 5.0 will be supplied to existing Tell-A-Graf users at no charge. The 3B20-compatible version of Disspla will range in price from $21,500 to $43,000.

Shipments of the latest Disspla release will begin this July from Issco at 10505 Sorrento Valley Road, San Diego, Calif. 92121.

Geisco incorporates Adas, Telex feature into its Mark III service

ROCKVILLE, Md. — General Electric Information Services Co. (Geisco) has upgraded its Mark III Shared Applications Service, a time-sharing computing service, to include Asynchronous Dedicated Access Services (Adas), intersystem file transfer and the capacity to dial out to send Telex Corp.'s Telex messages.

The dial-out-to-Telex feature reportedly allows computer-generated data to be sent to any business locations equipped with the Telex devices anywhere in the world. However, this capability requires arrangements to be made with an international record carrier — TRT Telecommunications Corp. — for the Telex service.

Adas reportedly allows Mark III Shared Applications clients to generate a high volume of communications traffic from a single site, and it provides access to the General Electric worldwide communications network via an intelligent multiplexer at the client's location.

Intersystem file transfers are accomplished via the Interface File Transfer Utility (Xfer), which permits companies to exchange large volumes of transactions.

The Xfer service is priced on the basis of the size of the data files transferred. Small files of 12K char. cost the sender $1.30 and the receiver $1. Large files (840K) cost the sender $54 and the receiver $44.

Adas is priced at a fixed monthly charge, ranging from $2,400 to $5,100. The cost of the dial-out-to-Telex service is priced at $40/terminal connect hour (TCH) for prime time and $20/TCH for nonprime time, plus an additional charge of 17 cents per 1,000 char.

Geisco is located at 401 N. Washington St., Rockville, Md. 20850.

Banks offered backup service

WAYNE, Pa. — Sungard Recovery Services, a division of Sundata Co., has announced a disaster recovery backup service for check processing operations at financial institutions.

Called Express Check, the service is offered jointly by Sungard and the First Tennessee Bank in Chattanooga, Tenn. Subscribers have access to multiple IBM 3890-B6 document processors with item numbering/endorsing and microfilming abilities.

The 3890 processors can be controlled by subscribers from one of four Sungard Recovery Centers through the use of IBM's Check Processing Control System or other 3890 software.

On-line communications is possible with Computerm Corp. channel extenders, which are IBM Series/1-based processors with special software programs that allow remote systems to function as if they were attached locally.

Prices range from $1,500 to $2,400 per month.

Sungard, Two Glenhardie Corporate Center, 1285 Drummers Lane, Wayne, Pa. 19087.

While everybody was talking about it, Pilot did something about it.

Pilot Executive Software announces a new class of software: The first mainframe Executive Information System (EIS). Developed by managers for managers, Pilot's EIS provides "status access" and decision-making facilities never before available.

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SYSTEMS SOFTWARE

STERLING SOFTWARE MARKETING, INC.

Comparex Release 4.4A

Sterling Software Marketing, Inc. has announced Release 4.4A of Comparex, a data and text file comparison utility for IBM's MVS/XA, DOS/VSE and VM/CMS operating systems.

Comparex is a file comparison utility that audits systems modifications within those IBM operating systems, the vendor said. Release 4.4A is said to provide direct support for users of IBM's IMS-DL/1, Fastpath and CICS-DL/1 and On-Line Business Systems, Inc.'s OBS/Wylbur conversational text editing system and Innovation Data Processing, Inc.'s Innovation Access Method system.

The spokesman said Comparex can now process partitioned data sets or directory-imbedded data sets, and it features an interface to IBM's Interactive System Productivity Facility that enables users to compare files, create test data and set general execution conditions.

Release 4.4A of Comparex is priced at $8,000 for the MVS/XA version and $4,000 for both the DOS/VSE and VM/CMS versions.

Sterling Software Marketing, 1007 Seventh St., Sacramento, Calif. 95814.

INFOCRAFT, INC.

DE/3000II

Infocraft, Inc. has announced DE/3000II, a new version of its DE/3000 high-speed, high-volume data entry system for Hewlett-Packard Co.'s HP 3000.

According to a spokesman, DE/3000II is a replacement for a dedicated data entry system. The system has standard edit checks such as batch balancing, cash totals, range checks, match checks, overpunch and skip fields.

DE/3000II consists of six programs — format, master, entry, verify, tables and reformat — that control data from the source document until it is released to the application program. An optional transmission program is available for transmission to the host system. The format program provides for the creation and modification of formats.

The master program creates jobs and batches, default format and level links and tracks the status of batches. The entry and verify programs include over 40 operator functions for efficient and accurate data entry. The tables program allows the user to validate data against an external table, and the reformat program automatically reformats large records into smaller ones, or it can reformat one record into multiple records.

DE/3000II is priced at $7,000, including one-year maintenance.

Infocraft, 1756 Manhattan Beach Blvd., Manhattan Beach, Calif. 90266.

MACKINNEY SYSTEMS

CICS/Spooler Release 2.0

MacKinney Systems has announced Release 2.0 of its CICS/Spooler software for IBM mainframes under DOS/VSE, OS and MVS.

A spokesman said the system allows batch reports to be sent to terminal printers and also allows CICS applications to generate reports to be printed on batch printers. Release 2.0 enhancements include an improved user interface, a security system to limit access to reports, predefined route lists for automatic report distribution to multiple printers and the ability to stop and restart printers.

Other features of CICS/Spooler include the ability to print selected pages of a report and automatic print initiation for batch-spooled reports, the spokesman said.

Release 2.0 of CICS/Spooler is priced at $1,295. The software can also be leased for $495 per year.

MacKinney Systems, P.O. Box 270A, Rte. 2, Fair Grove, Mo. 65648.

WESTINGHOUSE ELECTRIC CORP.

Westi/CICS Interface

Westinghouse Electric Corp. has announced a software module for its Westi teleprocessing system that reportedly permits users to employ a variety of programs produced by independent software developers for IBM's CICS teleprocessing monitor.

Called the Westi/CICS Interface program, the module also allows Westi users to use on-line application programs written in command-level Cobol. CICS application source codes and maps are processed through the Westi translator instead of the CICS translator, according to a Westinghouse spokesman.

The Westi/CICS Interface program operates under DOS/VSE and other vendor-compatible operating systems. A 10-year program lease is priced at $10,000.

Westinghouse Advanced Systems Technology, Management Systems Software, 777 Penn Center Blvd., Pittsburgh, Pa. 15235.

CJW MANAGEMENT SYSTEMS, INC.

Conversion tool

CJW Management Systems, Inc. is now offering users of Management Assistance, Inc.'s Basic Four Division systems a conversion tool that allows Basic Four programs to run on Data General Corp.'s machines.

An SMbasic interpreter program is used to convert the programs, reportedly without alterations. Programs converted from Basic Four to DG systems have been benchmarked at twice their previous speed, the vendor claimed.

Converted programs reportedly run on every machine in the DG line and are said to be able to operate

Continued on page 76

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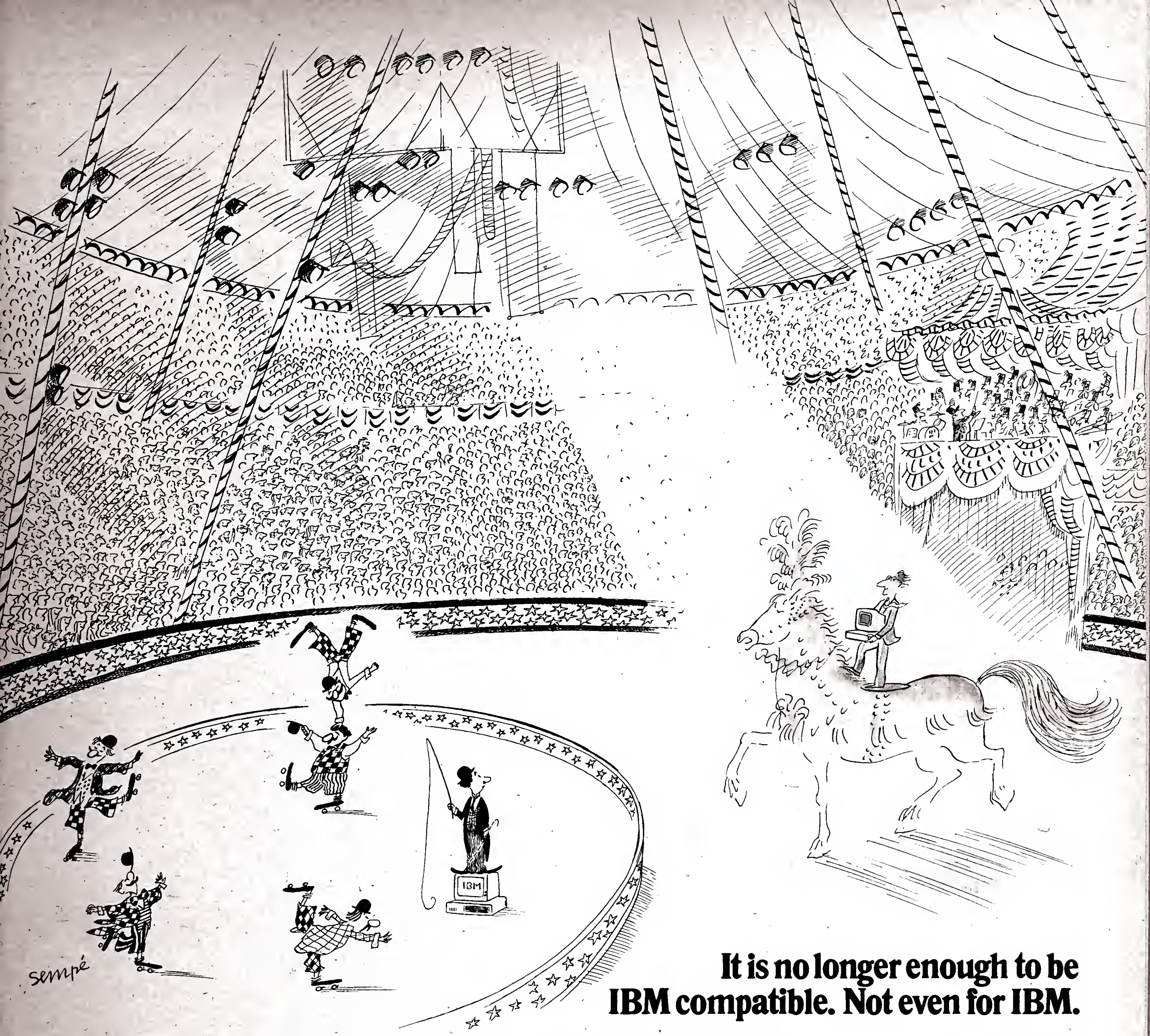

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The crowd grew restless as each new act continued to perform varying degrees of IBM compatibility.

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COMMUNICATIONS	Built-in Asynchronous
KEYBOARD	84 keys, 6 ft. cord
AUXILIARY MEMORY	Up to two internal 5¼" diskettes 10MB internal fixed disk when configured with single diskette.
USER MEMORY	Standard 128K bytes, expandable to 640K
DIAGNOSTICS	Power-on self test
CLOCK	Time-of-day with battery back-up

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SPERRY

The Sperry PC.
What the personal computer should have been in the first place.

Continued from page 74

with the user's existing peripherals. Users may also directly access their DG operating systems when reconfiguring their systems, rather than needing to mail in Basic Four disk packs as before, the vendor said.

The conversion of Basic Four software is priced at $3,500 for 20M- to 75M-byte machines. Prices in the DG line of computers offered by CJW Management Systems begin at $30,000.

CJW Management Systems, 22 Middlesex Lane, Yonkers, N.Y. 10710.

COMPUTER TECHNIQUES, INC.
PI-Q4

Computer Techniques, Inc. has announced PI-Q4 for users of Prime Computer, Inc.'s processors.

According to a vendor spokesman, the PI-Q4 system enables users of Prime computers to access both the Primos operating system and the Prime Information data base management system files simultaneously. PI-Q4 is said to integrate both Primos and Prime Information environments into one program.

PI-Q4 is priced at $4,800, the vendor said.

Computer Techniques, 1622 Main Ave., Olyphant, Pa. 18447.

DATABASE DESIGN, INC.
Data Designer for DOS/VSE

Database Design, Inc. has announced that its Data Designer software is now available for IBM's DOS/VSE operating system.

According to a spokeswoman, Data Designer is a logical data modeling tool that combines descriptions of individual user and application data requirements to produce a nonredundant, normalized, stable data base design. The design can reportedly then be implemented under any data base management system or file access method.

The shared data base designed under Data Designer reportedly eliminates the maintenance of redundant data and accommodates changing requirements with minimum reprogramming of existing applications. A perpetual license for Data Designer is priced at $23,500, including training, one-year maintenance and installation.

Database Design, 2020 Hogback Road, Ann Arbor, Mich. 48104.

PRODUCTIVITY AIDS

VENTURA COMPUTER SYSTEMS
System Information Reporting

Ventura Computer Systems has announced a package of productivity tools for the IBM System/38.

The System Information Reporting (SIR) package contains 10 productivity tools, each of which is designed to aid in System/38 documentation, according to a vendor spokesman.

Two functions included in the SIR package reportedly provide quick access to the field reference file. Other commands enable quick retrieval of information such as file access paths, object descriptions, member data within a source file and member information of source files. Additional commands reportedly include a diagnostic-only compile generator and file/program usage cross-reference generators.

The SIR package is priced at $1,000. Each of the tools is available individually at prices between $50 and $250.

Ventura Computer Systems, 1411 Kuehner Drive, Santa Susana, Calif. 93063.

APPLICATION PACKAGES

MANAGEMENT SCIENCE AMERICA, INC.
Alltax2

Management Science America, Inc. (MSA) has introduced a new version of its Alltax tax computation software. Called Alltax2, the software reportedly permits users to make tax changes without making a Cobol change or recompiling.

Alltax2 also reportedly changes the tax rate automatically on a user-specified date. Tax updates can be installed as they are received from MSA, and the system will determine when the changes will go into effect.

The Alltax2 system calculates multiple experience rates for an employer's state unemployment tax and handles daily, quarterly, semiannual, annual and other user-specified pay periods, a spokesman said.

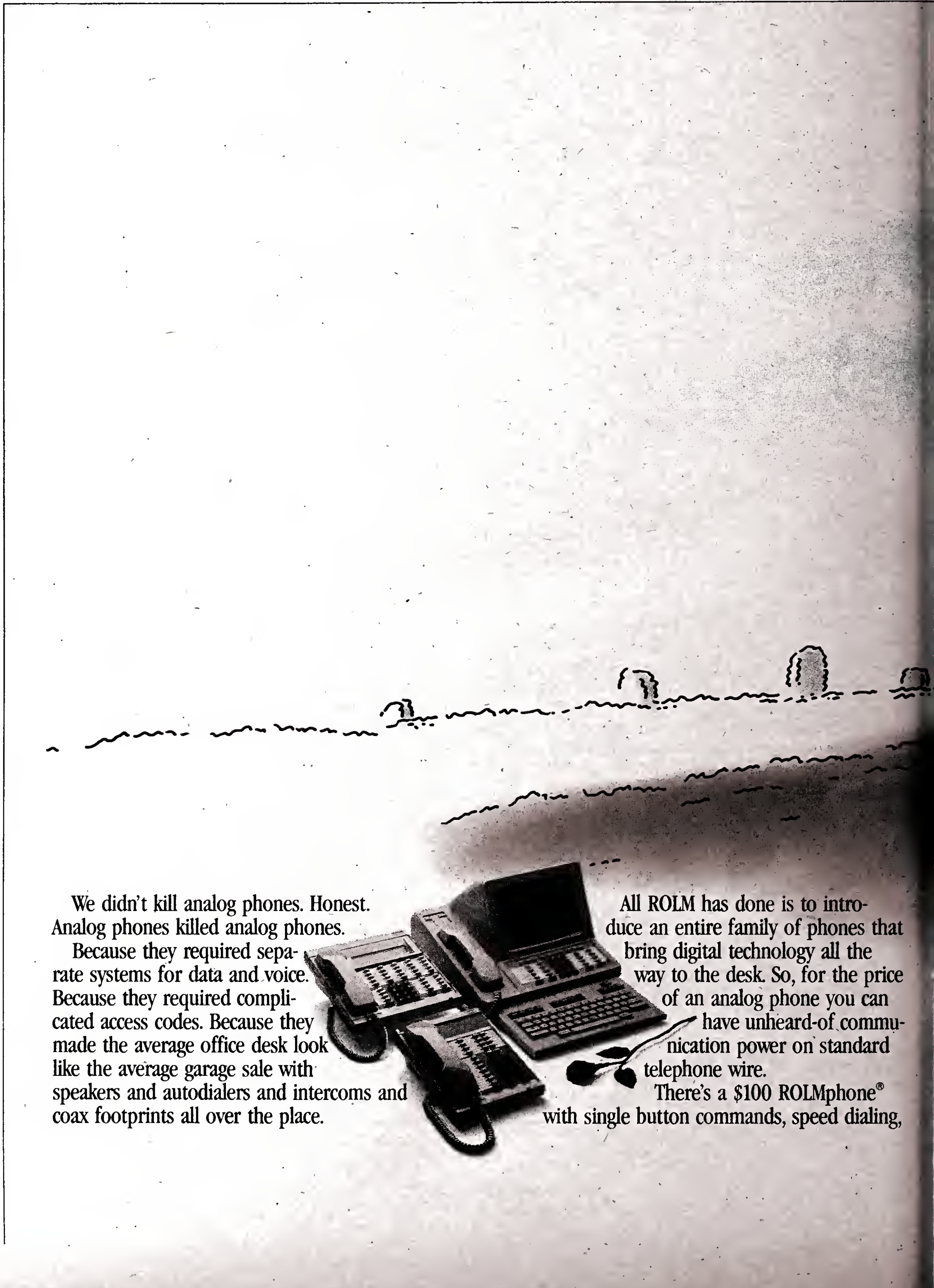
The software is priced between $2,500 and $7,700. It operates on the following machines: IBM mainframe computers and plug-compatibles; Honeywell, Inc.'s Level 6 and large processors; Hewlett-Packard Co.'s HP 3000 series; NCR Corp. mainframes; Sperry Corp. mainframes; Digital Equipment Corp. VAX-11 and PDP-11 models; and Burroughs Corp. large and medium-scale mainframes, the vendor said.

MSA, 3445 Peachtree Road N.E., Atlanta, Ga. 30326.

UCCEL CORP.
Infopoint

Uccel Corp. has announced an integrated banking software system for IBM mainframes.

Dubbed Infopoint, the system is said to address six operational and accounting areas within the banking industry, including depository processing, transaction processing, customer management, loans, general accounting and decision support. The Infopoint system consists of 19 applications that can be integrated or used



We didn't kill analog phones. Honest. Analog phones killed analog phones.

Because they required separate systems for data and voice. Because they required complicated access codes. Because they made the average office desk look like the average garage sale with speakers and autodialers and intercoms and coax footprints all over the place.

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There's a $100 ROLMphone® with single button commands, speed dialing,

separately, the vendor said.

Two major packages in the Infopoint system are the On-line Returned/Exception Item application and the Teller application. The On-line Returned/Exception Item application is said to provide on-line access to account status and balance information.

The Teller application is a multi-institution, on-line system designed to improve customer service with more efficient teller terminal processing. The application provides a real-time link between the terminal and permanent customer account files.

Infopoint operates under IBM's DOS and OS operating systems on IBM 4300 series and larger processors. The complete system is priced at $800,000 and individual modules are priced between $30,000 and $180,000, according to a spokesman for the vendor.

Uccel, Uccel Tower, Exchange Park, Dallas, Texas 75235.

STEEL HEDDLE

Electronic Tickler File

Steel Heddle has announced an enhancement to its mainframe electronic mail package for IBM 3270 environments.

The enhancement to the Wizard Mail package, called the Electronic Tickler File, reportedly enables users to write reminder messages to themselves or others for display and printout at specific future dates and times. The message is automatically available for reading at that time, a vendor spokesman said.

Also, incoming mail can be rerouted to the tickler file and mail being sent can include a tickler copy. All tickler messages dated for future delivery can be viewed at any time with no effect on the automatic display of future messages, the spokesman said.

Electronic Tickler File is priced at $895.

Steel Heddle, P.O. Box 1867, Greenville, S.C. 29602.

COGNOS, INC.

Multiview/Powerplan link

Cognos, Inc., formerly Quasar Systems Ltd., has announced a software link to connect its Multiview General Ledger financial software and Powerplan financial planning and graphics software for Hewlett-Packard Co.'s HP 3000 minicomputers.

The link is said to be automatic and bidirectional, providing menu screen options for controlled transfer of financial information to and from Powerplan. The vendor said managers can use the link to build reports, budgets, forecasts and to access HP's Decision Support Graphics package.

Financial, budgetary and statistical information from Powerplan reports can be transferred to Multiview General Ledger and entered into general ledger systems through a new connection to Multiview's standard batch interface. All information that passes through the link is validated before the general ledger is updated, according to the vendor.

The link will be provided free of charge to Cognos clients until August 31, after which time the price will be $2,000, according to the vendor.

Cognos, 1801 Oakland Blvd., Walnut Creek, Calif. 94596.

PROFESSIONAL SOFTWARE SUPPORT

V-Plan Electronic Spreadsheet

Professional Software Support has announced the V-Plan Electronic Spreadsheet for users of Digital Equipment Corp.'s Decsystem-10 and 20 mainframes.

According to the vendor, V-Plan offers linked ordering of recalculations, a feature that keeps track of the spreadsheet cells affected or used by a calculation.

In addition, V-Plan reportedly gives users access to Decsystem-20's extended addressing virtual address space. The extended addressing feature of the spreadsheet is available to users with Decsystem Model 2060 utilizing DEC's Tops-20 Release 5.1 operating system.

A single CPU license for V-Plan is priced at $2,950.

Professional Software Support, 2115 Hale Drive, Burlingame, Calif. 94010.

FUSION PRODUCTS INTERNATIONAL

Fusion/36 enhancements

Fusion Products International has announced a series of enhancements to its Fusion/36 Management Information Center software for the IBM System/36.

According to a spokesman, Fusion/36 has been enhanced to allow on-line displays to be windowed, creating a display up to 316 char. wide. The user reportedly can arrange the display so fields appear in any position and the display window may be moved horizontally to view the data.

In addition, the software also supports multiple data dictionaries, allowing a user to have an assigned data dictionary that describes the files and fields available to them. The Fusion/36 system is said to combine integrated information management, report writing, data dictionary, file maintenance and graphics capabilities, and it may be used with the company's Fusion/3 electronic spreadsheet system.

Fusion/36 is priced at $3,600.

Fusion Products International, Suite 295, 900 Larkspur L.C., Larkspur, Calif. 94939.

NEW GENERATION SOFTWARE, INC.

Accounts Payable

New Generation Software, Inc. has

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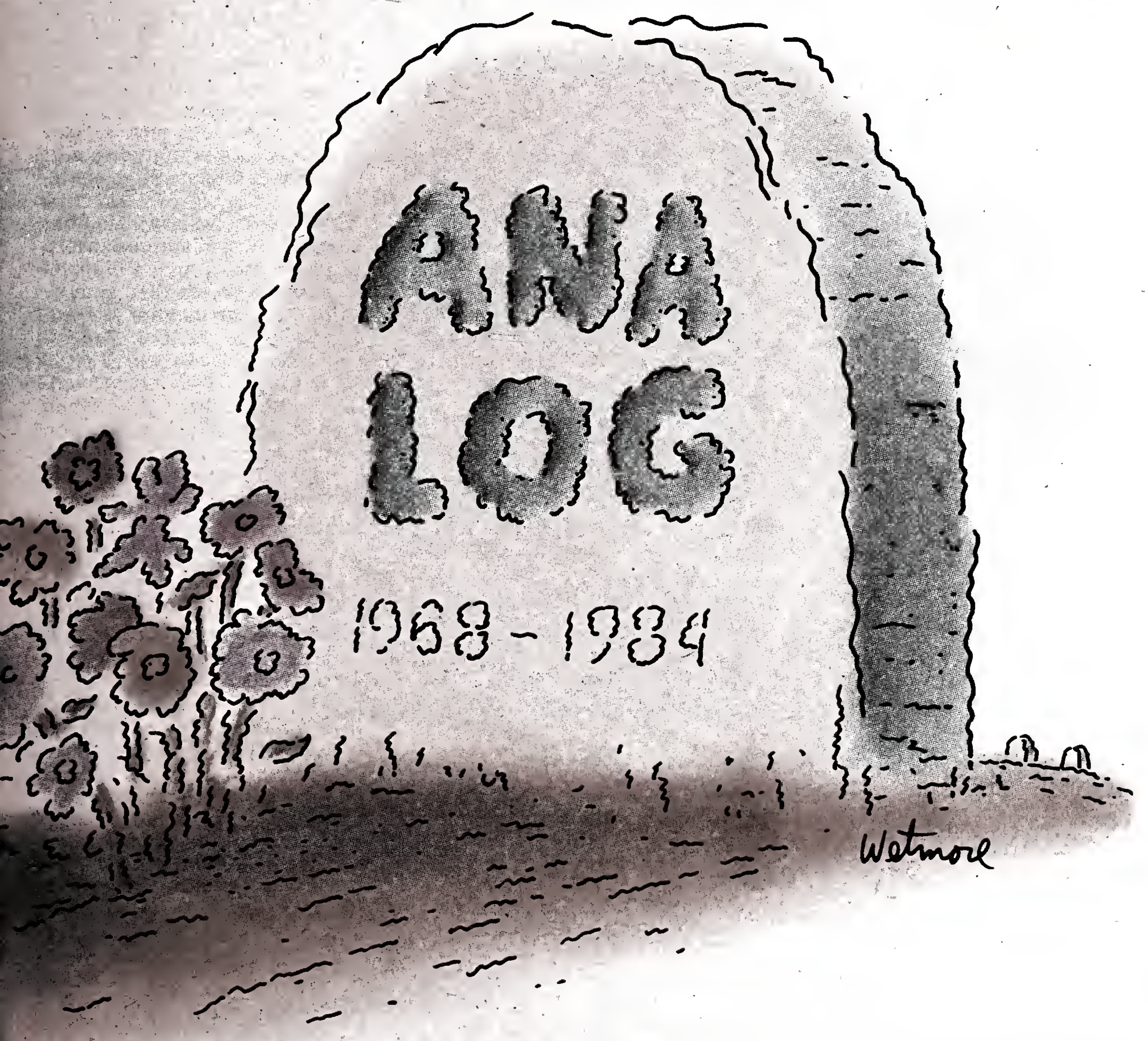

voice volume control and an optional RS232 port for flawless, simultaneous data and voice transmission.

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ROLM

4900 Old Ironsides Drive, M/S 626, Santa Clara, CA 95050 • 800-538-8154. (In Alaska, California and Hawaii, call 408-986-3025.)

SOFTWARE & SERVICES

Continued from page 77

announced the Accounts Payable software for its Finance/38 product line, the second of five modules designed for the data base architecture of the IBM System/38.

The first module, Financial Reporting & Management, a financial information management system, was introduced in 1983. Other modules in the Finance/38 line will be available later this year, the company said.

Features of Accounts Payable include: a report writer, security system, on-line inquiry ability, cash management functions, multidepartment and multiuser capabilities and flexible cash requirements.

Accounts Payable is priced at $9,500, the vendor said.

New Generation Software, 341 Lincoln St., Roseville, Calif. 95678.

REMOTE COMPUTING SERVICES

DIGITAL EQUIPMENT CORP.

Digital Software Information Network

Digital Equipment Corp. has announced a service tool that reportedly enables customers to access a data base for information and solutions to software problems.

Called the Digital Software Information Network, the tool provides dial-up computer-aided services to DEC's U.S. customers. A modem is required.

The network provides customers with messages about critical software problems and their solutions, synopses of product information and a symptom/solution data base for correcting problems, according to the vendor.

The service is available at no additional charge to customers with systems under warranty of a Decsupport or Basic Support service contract.

DEC, 146 Main St., Maynard, Mass. 01754.

ON-LINE DATA BASES

ADP NETWORK SERVICES, INC.

Bancorp

ADP Network Services, Inc. has announced the Bancorp data base of on-line banking industry data.

According to a vendor spokesman, Bancorp contains consolidated and parent company financial data as well as subsidiary bank and stock market information on more than 1,600 U.S. bank holding companies. The data base is said to be useful for investment research, money management, merger and acquisition studies and credit and competitive analysis.

The spokesman said that much of the data in Bancorp is derived from Y-9 Supplements, a report filed annually by bank holding companies with the U.S. Federal Reserve Board.

ADP makes Bancorp available through its traditional remote computing services, through its ADP/Onsite service and through ADP's Datapath microcomputer access method.

Use of Bancorp is transaction-priced — data items pulled from the data base, for example, are priced at 5 cents each — and requires no subscription fee, according to the vendor.

ADP Network Services, 175 Jackson Plaza, Ann Arbor, Mich. 48106.

MEAD DATA CENTRAL

Exchange

Mead Data Central has

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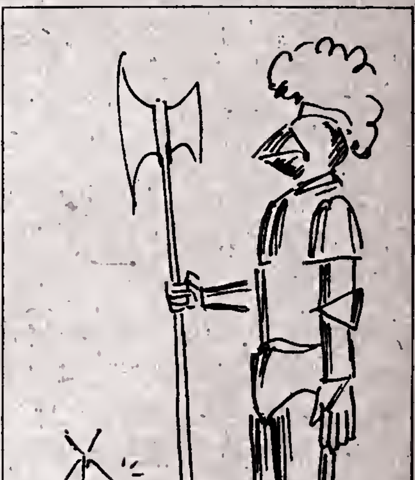
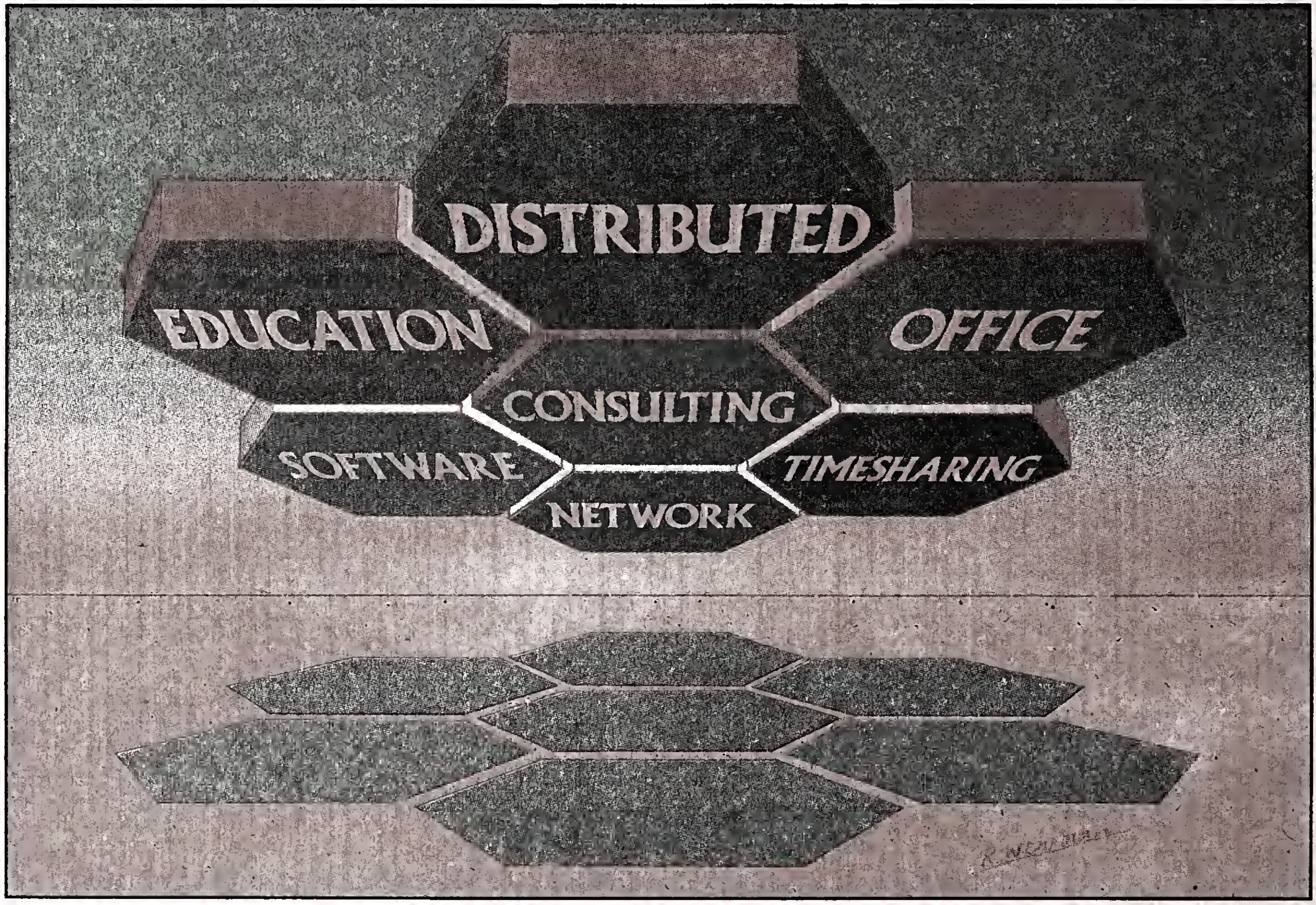


'Mommy?'

Meeting all your information needs requires total systems integration knowledge and experience.



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Or write BOEING COMPUTER SERVICES, M.S. CV-26-11B,
7980 Gallows Court, Vienna,
Va 22180.

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SOFTWARE & SERVICES

INDIAN

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This individual has uncovered one of nature's eternal truths: Wherever you go, whatever you do, you'll find a host of managers and their staffs worriedly hovering over the one soul who's actually doing the job.

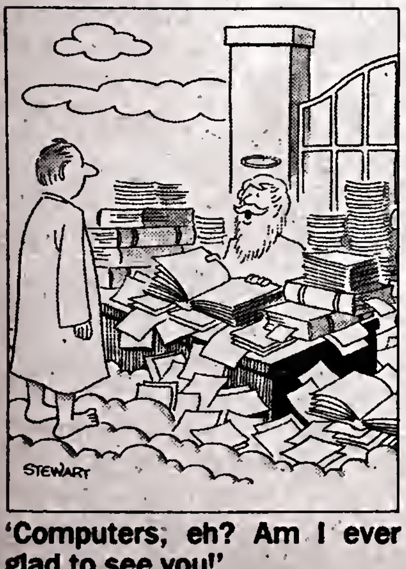
Newspaper headline: "4th Infantry Brigade Advances." Actually, two of the brigade's three battalions are guarding the flanks; only one is advancing. But that one advancing battalion has one company holding headquarters, one in reserve and only one company, in fact, moving up. Of the moving-up company's three platoons, the first is digging in, the second is providing fire support and the third is advancing. This third platoon has two squads holding each flank where sister companies are, while only one squad is actually under way. The one moving squad is composed of two four-man fire teams. One is prone, covering the other. The second consists of four muddy, sleepless grunts slogging up a hill, hoping not to get shot at. "4th Infantry Brigade Advances" means those four.

TV newscaster: "Work is proceeding on the construction of the Framis River Bridge." Look closely at the film clip: Those three hard-hatted gentlemen in business suits are accountants; the two fellows carrying rolls of papers, engineers; and the two with clipboards, expediters. Behind them all, obscured by the crowd, is a person in greasy coveralls, face hidden by a welder's mask, getting ready to strike an arc. That welder is the totality of "work proceeding."

Programmer/analysts work hours that would throw a union on strike. They're not invited to the meetings where decisions are made, yet they are held to the dates. They catch flak if the system is late and get to applaud the senior analyst's promotion if it's on time. They are the foot soldiers of our business and, yes indeed, are the ones who actually do the work while the rest of us hover over them, wringing our hands with worry.

How do they put up with it?

Beats me.



'Computers, eh? Am I ever glad to see you!'

Continued from page 78

added Exchange, a financial data base, to its family of on-line services.

Exchange reportedly contains research reports written for some 1,600 companies by analysts at Merrill Lynch Pierce Fenner & Smith, Inc.; Paine Webber Mitchell Hutchins, Inc.; Piper, Jaffray & Hopwood, Inc.; and Rausher Pierce Refsnes, Inc.

Zachs Investment Research, Inc. reportedly supplies consensus earning reports for the companies. The data base is said to include the full text of Securities and Exchange Commission filings for selected companies.

To utilize Exchange, users pay a monthly fee of $50, $20/hour connect time and an $8/hour telecommunication charge, according to the vendor.

Mead Data Central, P.O. Box 933, 9393 Springboro Pike, Dayton, Ohio 45401.

METHODOLOGIES

DATABASE DESIGN, INC.
Information Planner for MVS

Database Design, Inc. has announced the release of an IBM MVS operating system version of its Information Planner software. The system is also available for Digital Equipment Corp.'s VAX-11 systems.

According to a spokesman for the vendor, Information Planner automates strategic information systems planning methods, including IBM's Business System Planning, James Martin's Strategic Data Planning Methods and the Critical Success Factors approach.

The Information Planner system is said to provide an interactive, graphics-oriented user interface to a Planning Encyclopedia, which re-

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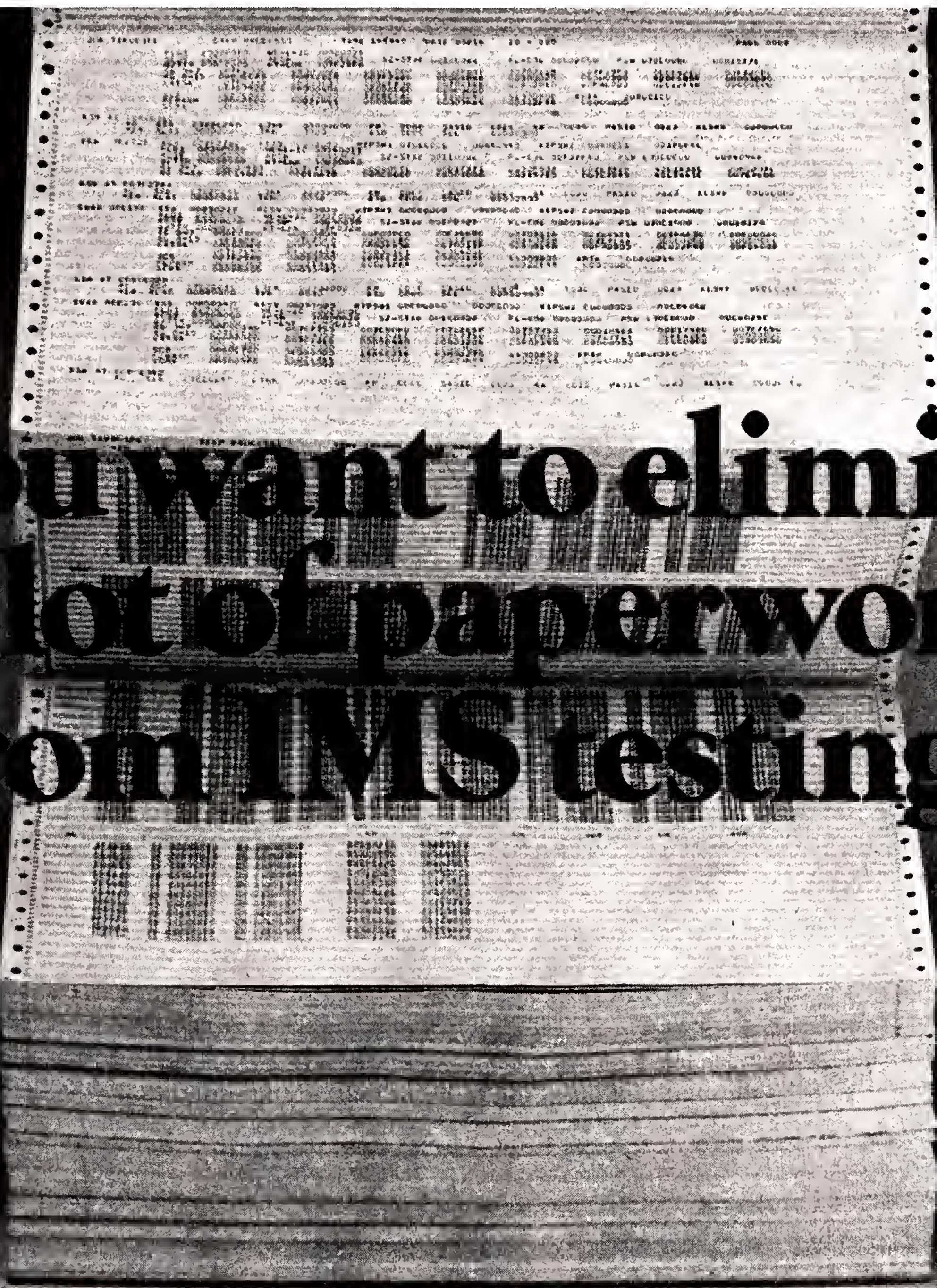

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Combing through computer printouts to determine an application program's effect can beat you to a pulp. Get DataVantage, the software that simplifies IMS testing. DataVantage automatically compares the data bases before and after a test is run and lists the differences. Waiting for dumps and searching through printouts by hand becomes history.

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For more information or a free 30-day trial of DataVantage, call toll-free 800-526-0272, or return the coupon. You'll be amazed how much you can reduce the volume of IMS work just by filling out this form.

Continued from page 79

cords basic business information, such as problems and goals, business functions and activities, information requirements, organizational and geographical structures and existing systems and data collections.

Analytic capabilities include consistency analysis, ad hoc inquiry and affinity analysis, according to the vendor.

The system is said to work in any IBM environment equipped with MVS, IBM's Interactive System Productivity Facility and IBM 3270-type terminals.

A perpetual license for Information Planner is priced at $25,000, according to a spokesman for the vendor.

Database Design, 2020 Hogback Road, Ann Arbor, Mich. 48104.

NBS

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tion, verification and testing procedures. The guide also shows how the output of one phase can be used for validation, verification and testing in the next phase.

In addition, the document presents three levels of recommendations for managing projects of varying degrees of complexity and importance. A representative validation, verification and testing plan is included as well as an example of the techniques as applied to an insurance application.

Called Fips Publication 101, the guideline is available for $8.50 from the the U.S. Department of Commerce, National Technical Information Service, which is located at 5285 Port Royal Road, Springfield, Va. 22161.

CHOICE

from page 71

what you do, step by step, from intake to delivery, whether you deal in services or in goods. From this review, you can determine where software applications can aid you.

Reviewing your assessment of needs, you should designate each possible application area as an essential, desirable or optional application of the software you will select.

Establish a software selection team

Early in the evaluation process, it is important to include key people who will be involved in and affected by the change in computer systems. A representative from each area should be appointed to a software selection team. The representatives' input is important, for they will be your main resource as to how a specific department functions, and by their participation, they become committed to the change.

The team should have decision-making powers sufficient to allow it to deal with the various vendors it will be considering.

The team members' primary purpose is short-term: They are to define specific goals and objectives for the timely selection and implementation of the software.

Investigate software solutions

The first step here is to gather information. There are several ways to do this:

- ■ Review software directories.
- ■ Review listings in trade publications.
- ■ Visit vendors at trade shows.
- ■ Contact software vendors for overview information.
- ■ Attend hardware users group sessions on software.
- ■ Attend seminars conducted by software vendors.

Comparing vendors

Your selection team now should be ready to narrow the field of possible suppliers based on what you need and what is available.

You should determine which vendors best provide answers for your expressed needs. You should evaluate each on compatibility of software with hardware and the record of successful system implementations. You will want to know the availability and skill of the support staff the vendor maintains in your area. Will it be able to make the modifications or customizations that you might desire?

Most importantly, you will want to make a critical assessment of the financial stability and history of the vendor. Will it be there when you need it?

The next step should include a more detailed evaluation of top contenders. You may wish to issue a brief request for information. This is a good practice, as it forces you to articulate your requirements and prepares the vendor for his responsibilities.

Evaluating the cost of the package

Several factors affect the final cost of any software package. Most important are the level of sophistication of the application, the reliability of the product and the degree of support offered by the vendor.

The cost of support programs is sometimes included in the final cost of the package, though it is often figured separately.

In determining what it will cost to acquire an applications system, you should remember that software vendors don't actually sell their product to you: They lease or license its use for either a specified or unspecified period of time.

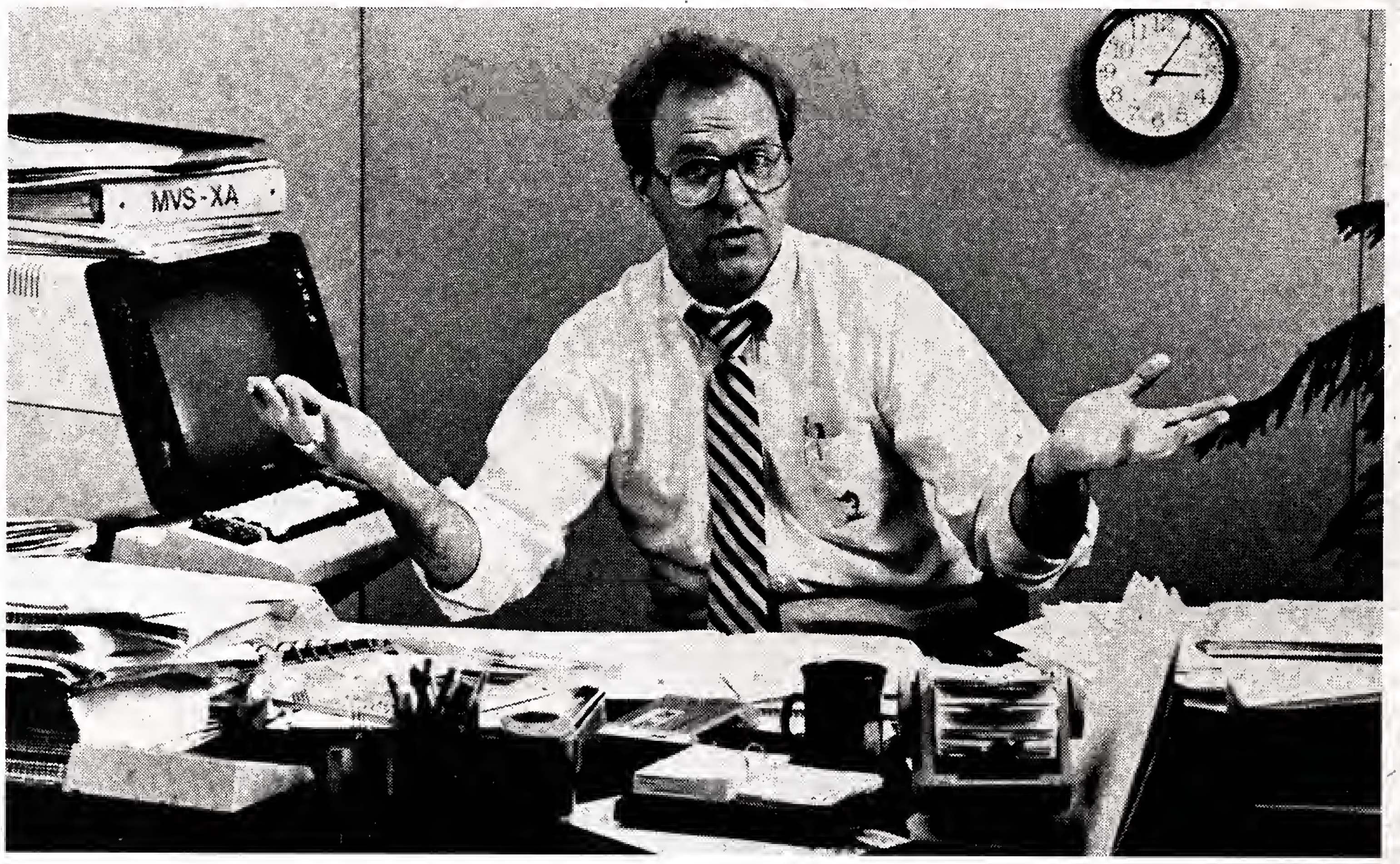
Making the decision

Up to this point, all your effort has been preliminary work. You earn the return on your investment of time and thoroughness at that point when you sit down to make the final decision on what software system best suits your company's needs.

If your preliminary work has been carefully accomplished, you should come to this decision confident in your ability to make the right choice.

The choice, ultimately, is yours.

EasyPROCLIB gave me an extra half day a week! *



EasyPROCLIB is a unique operating system enhancement that proves that you can please all of the people all of the time.

If you're in charge of your data center's procedure library, it works for you by taking the responsibility for maintaining, controlling and repairing the system PROCLIBs off your shoulders, freeing up time to get other work done.

"We have over 500 users. It would be a nightmare to manage without EasyPROCLIB."*

Users like it because it gives them control of their own PROCLIBs, and they can modify them any time without involving the systems staff.

And data center management likes it because it increases overall productivity. If a user crashes his private library, it doesn't affect the system or other users. An EasyPROCLIB diagnostic message notifies the user, and he is responsible for repairing or restoring it.

"What would I do if they told me I had to give up EasyPROCLIB? I'd fight them."*

There's no limit to the number of procedure libraries that may be established with EasyPROCLIB. There can be a private procedure library for each department, each development group, each programmer – for as many different divisions as you need. This means that you don't have to worry about deciding whether a procedure should be included in the installation's procedure library – and users don't have to try to accomplish specific applications using less efficient general purpose procedures.

Because EasyPROCLIB is completely transparent, many users don't know that they have it. But the data center management and staff know – because it simplifies their job, cutting down housekeeping time and giving them more time to manage. Since it was introduced six years ago, EasyPROCLIB has been installed at hundreds of IBM MVS sites, and wherever it's been installed, it's still at work.

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Software Corporation of America

*Comments from interviews with EasyPROCLIB users.
**Comment from Software Corporation of America.
EasyPROCLIB (for IBM, MVS/XA, MVS, SVS, VS1, MVT)

SPECIAL REPORT

Software productivity

Handling the application backlog

May 28, 1984

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Legend holds true for fourth-generation tools

By George Schussel
and James Davey
Special to CW‡

> *Report writers first appeared in the 1960s, and query languages became widely used in the latter part of the 1970s. Today these early systems have evolved into diverse types of systems suitable for solving most programming tasks.*

If you are interested in software, you have heard about fourth-generation languages. These tools are described as nonprocedural alternatives to traditional programming languages such as Cobol, Fortran and assembler. Folklore has it that fourth-generation languages can improve coding efficiency and timeliness by factors of five to 50. The folklore is true.

The precursors of today's fourth-generation languages were report generators and query languages. Using a report generator, a programmer or application user could create a standard report using five to 10 lines of code rather than the 400 to 500 lines it would take with a programming language such as Cobol. Using a query language, an application user could access information in a data base without writing a complex program.

The early report generators became more general-purpose and evolved into application generators, and these evolved further into very high-level programming languages. The functions of the query languages were extended beyond simple data base access and evolved into nonprocedural languages.

The efficiency of modern fourth-generation languages comes from their much higher level statements (specification of tasks rather than how to do those tasks), which result in many fewer lines of human code to do the same tasks as older languages.

Report writers first appeared in the 1960s, and query languages became widely used in the latter part of the 1970s. Today these early systems have evolved into diverse types of systems suitable for solving most programming tasks. There are several different categories of fourth-generation languages:

- Query and report languages.
- Fourth-generation programming languages.
- Information center tools.
- Cobol program generators.
- Decision support systems.

Principally designed for end users, these products are either menu driven or coded using very high-level, English-like statements that can search a file and produce a report or a query response. Most query languages allow diverse searching of data bases or files but do not allow updating of these files.

Artificial intelligence or free-form, English-like languages are in this category. Intellect by Artificial Intelligence Corp. (distributed by IBM and others) and Prolog are good examples of artificial intelligence languages.

Other query languages can make products that are inherently difficult to use available to managers or other support staff. Application Software, Inc.'s ASI/Inquiry and the various products from Informatics General Corp. (Mark V, Answer DB and so on) are good examples.

Sophisticated report writers that offer general systems-building capability, but that are not classified as true data base management systems (DBMS), could also be considered in this category. Multiplication, Inc.'s Imagine is a good example of a fourth-generation report writing tool.

Programming languages

These products are typically supplied by DBMS vendors and can be used in concert with the DBMS or against such files as Vsam or Isam. They are intended for use in the DP shop and are most productively used in generating screen-oriented, on-line programs. These products have multithreaded interfaces and are suitable for large-scale teleprocessing types of problems.

Typical of these products are Mantis from Cincom Systems, Inc., ADS/On-Line from Cullinet Software, Inc. and Ideal from Applied Data Research, Inc. They offer greatly improved programmer productivity over standard third-generation programming languages, because routine tasks are predefined.

Tools for screen development, report definition and data base description are included as part of the language, and the syntax encourages well-structured programming techniques. Simple tasks can be defined using simple statements, but users are unrestricted in their freedom to define complex control structures when they are needed to deal with complex tasks. These programming languages are not nonprocedural, and they require training and experience to be used most effectively.

Information center tools

Typically these are complete programming facilities with embedded DBMS, screen generators, statistics, graphics and links to various other DBMS packages. Products in this category have all of the tools necessary to perform even complex logic and have development languages that have a combination of nonprocedural, English-like statements and regular procedural logic. These systems are usually single-threaded for update processing and are not suitable for large teleprocessing environments.

Typical examples of these tools are Ramis II from Mathematica Products Group, Inc.; Focus from Information Builders, Inc.; and Nomad 2 from D&B Computing Services. These facilities provide a more natural interface than a procedural programming language. These languages are also relatively easier to learn than Cobol and CICS, and users need not be concerned with control statements, loops or data base navigation.

The system selects the processing strategy, and performance depends on the ability of the system to optimize data base access and processing steps. If the application is too complex to be stated in the system's internal nonprocedural language, most of these products offer an internal procedural language or interfaces to standard third-generation languages. These languages are easy to learn and are well suited for nonprogrammer application users.

Cobol program generators

These products are similar to fourth-generation programming languages except that they are designed to live in a Cobol or PL/I world. This means that often they can be used in a maintenance environment against existing Cobol programs. Typically they are designed to work with Vsam files or a common third-generation DBMS such as IMS by IBM or Total by Cincom Systems, Inc.

This category is a good choice for the shop that has a lot invested in third-generation software technology and wants to move slowly into new techniques without making existing programming obsolete. Most Cobol program generators support IMS and Vsam file structures.

Some of the best examples of these products are IP/3 from Computing Productivity, Inc.; Telon from Christensen Systems, Inc.; and Pacbase from CGI Systems. An integrated active data dictionary/directory (which is not available from IBM) is normally supplied as part of a Cobol program generator.

Decision suppport system (DSS) tools are similar to information center tools. One principal difference, however, is that DSS are usually marketed to end users rather than to DPers. DSS also have embedded simulation languages that are suited to fi-

See **FOURTH** SR/6

Schussel is president and Davey is a senior research associate of Digital Consulting Associates, Inc., a consulting firm based in Andover, Mass.

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T. Capers Jones on life without programmers

A look at reusable code, automated workstations and other alternatives

With programmer productivity becoming one of the hottest data processing topics of the 1980s, T. Capers Jones has stepped into the limelight. Jones, who recently joined Nolan, Norton & Co. as manager of the application management practice, has focused on productivity since 1967, when he started at IBM. He is the author of the highly regarded Programming Productivity: Issues for the '80s, *which ranks as one of the 10 top-selling books published by the Institute of Electrical and Electronics Engineers. His new book,* Programming Productivity: Steps Toward a Science, *will be published by McGraw-Hill Publications Co. this fall.*

For the past four years, Jones was assistant director of programming technology at the ITT Programming Technology Center in Stratford, Conn. There he was charged with introducing productivity methods into the massive communications company. Jones was interviewed at Nolan, Norton headquarters in Lexington, Mass., by Computerworld *Senior Editor/Software Paul Gillin.*

Q There's been a lot of talk for the last several years about programming without programmers. How close are we to that as a reality?

The whole topic of alternatives to programming covers a lot of ground: application generators, very high-level languages, libraries of reusable code and, in some cases, functions migrating into [very large-scale integration] or microcode. My view is that the technology that is probably ahead at the moment is libraries of standard functions and reusable code.

There are [large] companies today that are developing new applications with over half of the functions coming from libraries of standard code. They're finding productivity rates of 24,000 to 28,000 lines of code per man-year, but over half of that is borrowed from a library of standard functions. I predict that by the end of the century, probably half the code delivered will come from some reusable source.

Q Reusable code, I think, is not terribly well understood. How do you define it?

Actually, reusable code, application generators and fourth-generation languages are variations on a common theme. The essence of the variation is that many things in programming have been done many, many times before. There's no need to reinvent common algorithms.

The variation is in the access method for getting hold of that common function. In reusable code, the selection is done by a live person selecting from a library and linking it. In an application generator, the same function is hidden in the generator. You simply describe questions about your application, and the generator logic selects the function from its source.

With very high-level languages, you're getting an increasingly powerful repertoire of standard functions embedded in the language in the compiler and on-line access to those functions by means of commands.

Q Why has reusable code not caught on commercially?

There's a time span from the moment a new technology's invented until it reaches commercial acceptance. For example, it took many years for rifles to replace muzzle-loading muskets in the military.

There are also some cost elements and business factors that need to be solved before the technical problems can be addressed. Reusable code requires a little more time and a slightly more rigorous development process than just developing a customized piece of code.

One of the business problems is that the person that first develops the code gets no benefits at all. It's the users that come after that get the benefit. Unless companies can provide some kind of incentive to convince developers to do code in a reusable fashion, plus pay the overhead costs of manning the library and stocking the functional catalog, there's no incentive to do it in the first place.

Q Why not just take modules out of applications that are being written and build the library as you go along?

Attempts to do that generally have been unfortunate. One reason is that reusability has to be designed in. You need relatively constricted interfaces, and systems developed at random are not suitable for that. In fact, until structured programming methodologies become common, selecting code at random for reuse would not be a good choice because it would probably be so poorly designed and structured that you would not want to reuse it.

Q What is the major barrier to real productivity improvements in most DP shops today?

I would say historical inertia and the fact that people are so busy that they don't have the time or leisure to reflect on ways of doing things better.

The companies that are setting records in productivity have put some substantial research efforts into it, and there were some fairly sizable overhead costs before productivity gains were achieved. It may have taken three to five years to select the technology, stock the library and get it running.

Q In what area of the system development life cycle do you think productivity improvements could have the greatest benefit?

Coding productivity is coming under control, so there are two other areas that need to be explored. One is productivity in paperwork. For large systems, especially those written under government contract, perhaps half of the total cost is devoted to paperwork. There may be as many as 200 English words created for every line of source code. Some of these big systems generate over 100 different types of documents. Internal projects usually have smaller document sets, but you're still looking at 20 to 25 kinds of documents. The documentation support in many enterprises is pitifully inadequate to handle that.

Documentation support systems are slowly starting to reach the marketplace. Skeleton outlines for common document types, boilerplates built into the system and, more exciting to me, integrated text/graphics terminals [have the greatest potential to address the problem].

The next big area is the cost of defect removal, which for most internal projects is the most expensive activity.

The science of optimizing defect removal is starting to reach respectable proportions. It's now possible for a company to tailor a defect removal series of five to nine different kinds of inspections and tests that will get the highest possible combination of efficiency, low cost and short schedules.

Q Do you see a large market for workstations that automate design and documentation?

Companies that are beginning to market the right kinds of tools to the computing industry itself are going to have one of the biggest markets in world history. With the computing industry becoming one of the biggest in the world, the shortage of tools is starting to be understood.

Right now a programmer, even in a full development support environment, probably only has 10 to 15 tools available to him and a manager less than five. By the end of the century, I expect 80 to 90 powerful tools will be available to the programmer and manager for the development and support of software projects.

Q What is the best way to measure productivity?

The hottest item in commercial software measurement is the function point method developed by Al Albrecht at IBM. That is an attempt to get outside the coding and to look at the external characteristics of software.

The function point method says let's forget about lines of code; let's try to measure the external characteristics of our software, that is, the number of inputs, the number of outputs, the number of master files and the number of inquiries. Some recent findings [in this area] are very revealing. For example, PL/I programs tend to average about 65 source statements per Albrecht function point. Cobol programs average about 105, whereas assembly language probably averages over 300. So you can see that with PL/I, you have to write a smaller quantity of code than with Cobol.

Q Do you think Cobol is here to stay?

I think Cobol is to programming what the Qwerty keyboard is to typing. It isn't optimal, but so many thousands of people have been trained in it and so many tools support it, that it probably is here at least for the rest of the century. [However, it will be used less frequently.]

Q End-user computing was for a long time touted as the answer to the applications backlog. Does it still look like the shining star it once was?

End-user computing [can provide] substantial improvements. In typical enterprises, there are a lot of simple queries and file interrogations that have been done in the past by programmers that probably will be off-loaded to end users. But users still can't develop an eight million- or 10 million-line production system.

However, I will speculate that by 1990, if you look at all the programs that are being created in industrial and commercial organizations, over a third of them will be done by users.

Q Do you see a major breakthrough coming in programmer productivity?

See **JONES** SR/6

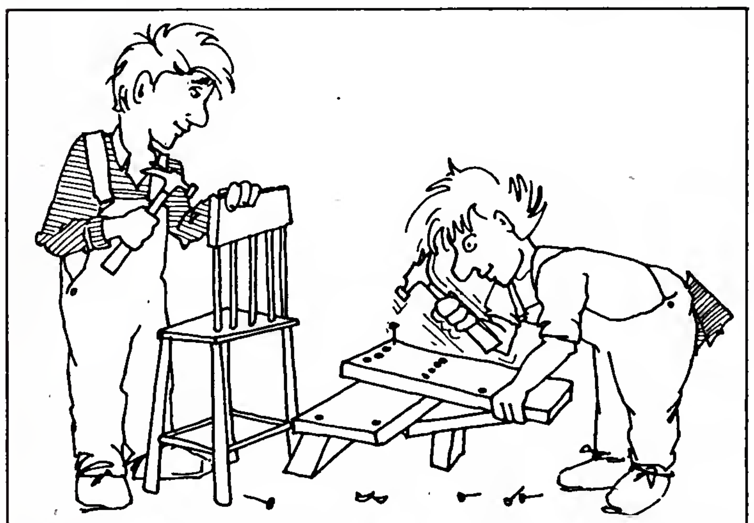
Fourth-generation tools mount a good offensive

By Merle Parks
Special to CW‡

How large is your application backlog?

Surveys of DP shops around the world continue to come to the same conclusion: Application backlogs of two to three years are almost the rule. With large Fortune 500 users, backlogs of five to seven years are not uncommon.

Parks is a Kansas City, Mo.-based district sales manager for Cincom Systems, Inc.



Using lines of code as a measure of productivity is like judging carpenters on their ability to drive in nails quickly. The best measure of productivity is the bottom line results.

And instead of improving, the gap between capability and demand gets worse each year — an annual shortfall of from 20% to 50%.

IBM studies indicated that 93% of users surveyed have an application backlog of 18 months or more. But if you ask end users, it's clear that this is only the tip of the iceberg. A study by MIT's Sloan School of Management indicated that end users have application needs that increase the above figures by a factor of 1.8. This invisible backlog consists of applications that users have not even bothered to request, knowing full well that they will be told to get in line with all the others. This situation is intolerable. Out of frustration, users turn to personal computers, standalone application computers and application systems that are often purchased without the involvement, or against the express wishes, of the data processing department. Multiple versions of data inevitably result, with concomitant security headaches.

The use of fourth-generation application development tools remains the best offense DP can mount against application backlogs and end-user frustration. However, you should tread carefully when implementing such tools in your shop, because application development tools are definitely not created equally.

For example, virtually any fourth-generation language will give you the ability to write good code faster. However, it will also give you the ability to write bad code faster. Obviously this is not a gain in productivity. Writing bad code faster simply makes your productivity problem worse.

Consider an analogous situation in the building trades industry. How do you compare the productivity of Carpenter A to that of Carpenter B? Suppose Carpenter A is a whiz with his hammer, driving in twice as many nails as Carpenter B over the same time period. Is Carpenter A, therefore, more productive?

The only useful way to measure productivity, whether you are talking about carpenters or programmers, is the good old bottom line. How long did it take? How much labor, materials and resources were required? Does the finished product actually perform the function for which it was designed? And, finally, how much maintenance is needed to keep it fully operational?

The bottom line is where it counts. Fourth-generation application development tools should be evaluated in terms of quantifiable results, not simply lines of code. If you really want to have a positive impact on productivity in your shop, ask yourself the following questions when you evaluate fourth-generation application development tools:

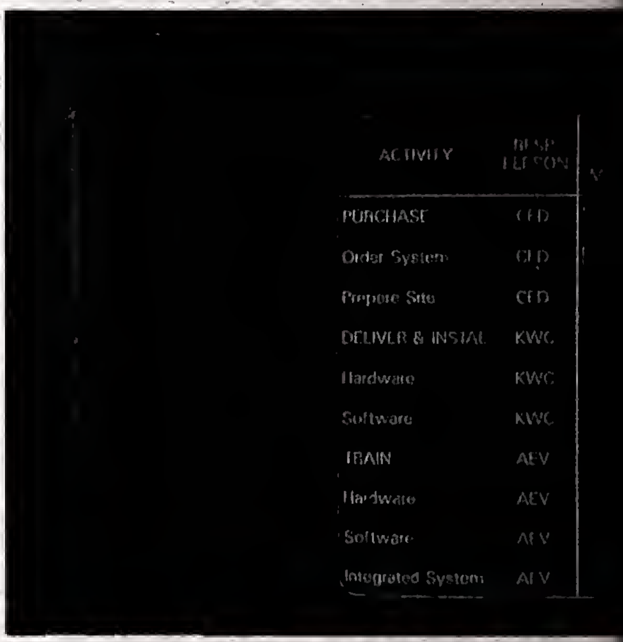
■ Will the tool give you productivity in the production center as well as in the development center and the information center?

To meet the full spectrum of needs of all end users, the tool should offer both nonprocedural functions and the power of a procedural language. This kind of flexibility allows you to develop and use simple applications as well as complex business or scientific applications. This kind of tool operates equally well whether it is used in the production center, the development center or the information center.

■ Is the tool efficient?

If the tool is to be widely used, it must provide you with execution performance figures no greater than 2:1 compared with Cobol. Even though computing power keeps getting cheaper, a language that consumes four to five times the normal equipment resource is too expensive and offers unacceptable terminal response time.

See **LINE** SR/8



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Testing, debugging tool a hit with Topps

Pinpoints problems quickly, reduces system downtime

BROOKLYN, N.Y. — For the maker of Bazooka bubble gum, debugging Cobol programs directly from CICS was as much a hindrance as is removing sticky bubble gum from a child's face. Topps Chewing Gum, Inc. here, ranking as one of the largest manufacturers of chewing gum, confectionary products and baseball cards, needed an approach to increase programmer productivity.

With sales of about $70 million, Topps has computer operations that reach into every aspect of the company's business. Using an IBM 4331 computer running under DOS/VS(E), the Topps DP center supports an array of applications for manufacturing, shipping, accounting and personnel. Maintaining and expanding these applications placed an increased demand on the programming staff for more Cobol programs.

After examining ways to facilitate the programming effort, the DP center management concluded that the most cost-effective approach for increasing productivity was to incorporate software sophisticated enough to test and debug Cobol programs directly from CICS. After looking at many products, Topps selected CA-Eztest/CICS from Computer Associates International, Inc.

Dave Fishman, manager of systems and programming for Topps, explained. "We needed a quick way to pinpoint the bugs that occurred in the Cobol code. Because of the growing complexity of our programs, it became increasingly difficult to isolate and define problems. We also needed a way to facilitate the detailed testing that is required for all of our programs.

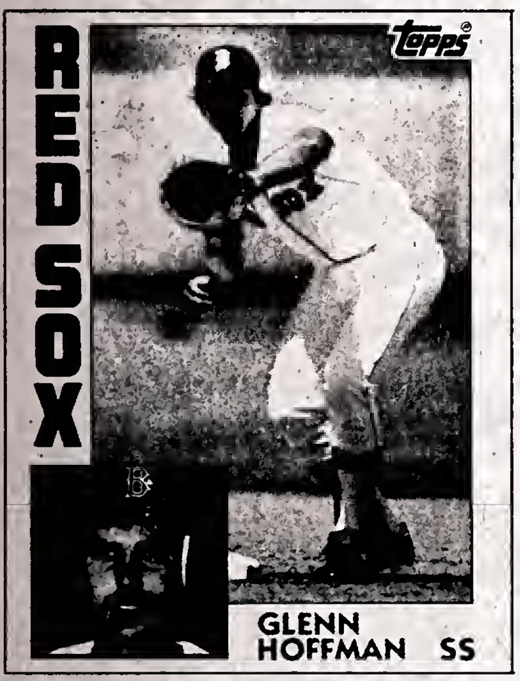
"We use Pansophic Systems,Inc.'s MIS/OL for Cobol program development and find it very effective," he said. "However, it is limited in its usefulness in testing and debugging Cobol programs, because it can only detect errors that occur in an MIS/OL function. If the problem originates in any Cobol command-level code that we have written, MIS/OL is powerless to isolate it. "It was CA-Eztest/CICS' ability to interface with MIS/OL that made it stand out from the other products we looked at. It was the only product that was adaptable enough to work with MIS/OL."

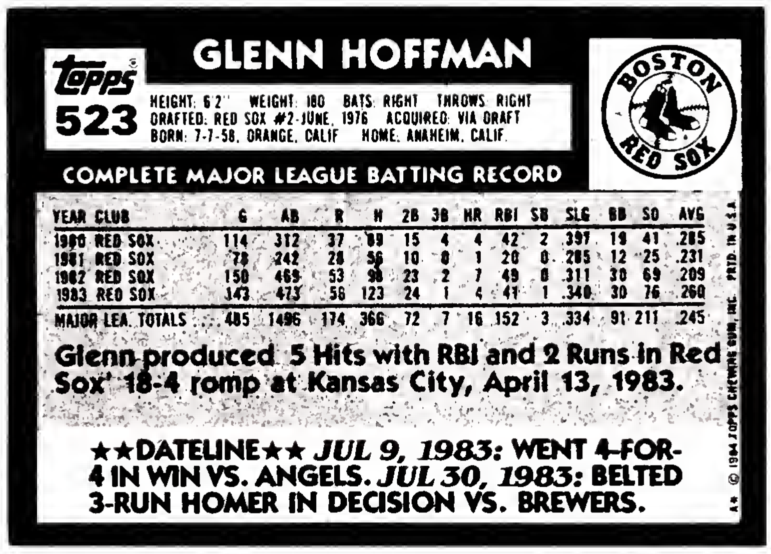
Ivan Dixon, a programmer/analyst for Topps, described how he works: "The Cobol programs are compiled under CA-Eztest/CICS. If CA-Eztest/CICS detects an error during program execution, it intercepts the error and stops the program immediately.

"It then provides us with a snapshot of all program components, including the program itself, any screens used by the program during execution, all of our work areas, all of our storage areas and the like. We can then locate and fix whatever errors occurred and let the program continue running.

"CA-Eztest/CICS rids us of having to go through the tasks usually associated with testing Cobol. We no longer have to execute the program, wait for it to abort, wait for a hex dump, wade through reams of paper searching for the problem, finally fix the problem and restart the cycle all over again, hoping that it works correctly the next time."

A CA-Eztest/CICS facility protects Topps' CICS production environment from corruption with test transactions. "Before we had CA-Eztest/CICS," Dixon said, "we used to bring CICS down about three to four times a week. . . . CA-Eztest took care of that problem as well."





GLENN HOFFMAN

Topps
523

HEIGHT: 6'2" WEIGHT: 180 BATS: RIGHT THROWS: RIGHT
DRAFTED: RED SOX #2-JUNE, 1976 ACQUIRED: VIA DRAFT
BORN: 7-7-58, ORANGE, CALIF HOME: ANAHEIM, CALIF.

BOSTON RED SOX

COMPLETE MAJOR LEAGUE BATTING RECORD

YEAR CLUB	G	AB	R	H	2B	3B	HR	RBI	SB	SLG	BB	SO	AVG
1980 RED SOX	114	312	37	89	15	4	4	42	2	.397	19	41	.285
1981 RED SOX	78	242	28	56	10	0	1	20	0	.285	12	25	.231
1982 RED SOX	150	469	53	98	23	2	7	49	0	.311	30	69	.209
1983 RED SOX	143	473	56	123	24	1	4	41	1	.340	30	76	.260
MAJOR LEA. TOTALS	485	1496	174	366	72	7	16	152	3	.334	91	211	.245

Glenn produced 5 Hits with RBI and 2 Runs in Red Sox' 18-4 romp at Kansas City, April 13, 1983.

★★DATELINE★★ *JUL 9, 1983:* WENT 4-FOR-4 IN WIN VS. ANGELS. *JUL 30, 1983:* BELTED 3-RUN HOMER IN DECISION VS. BREWERS.

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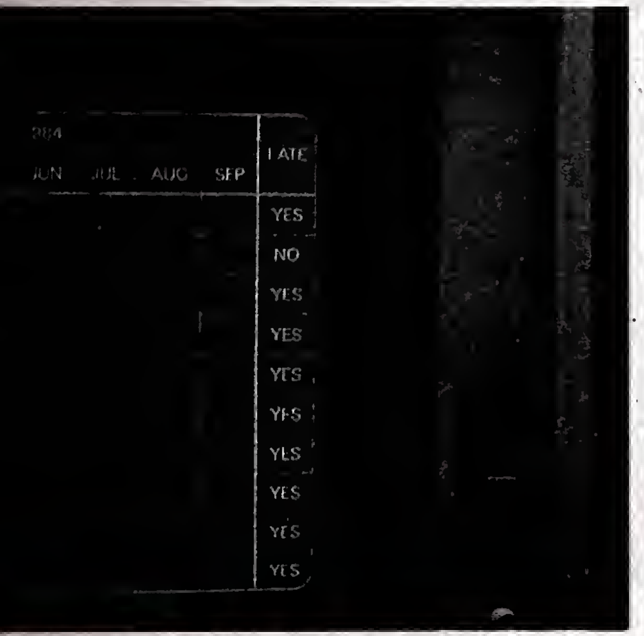

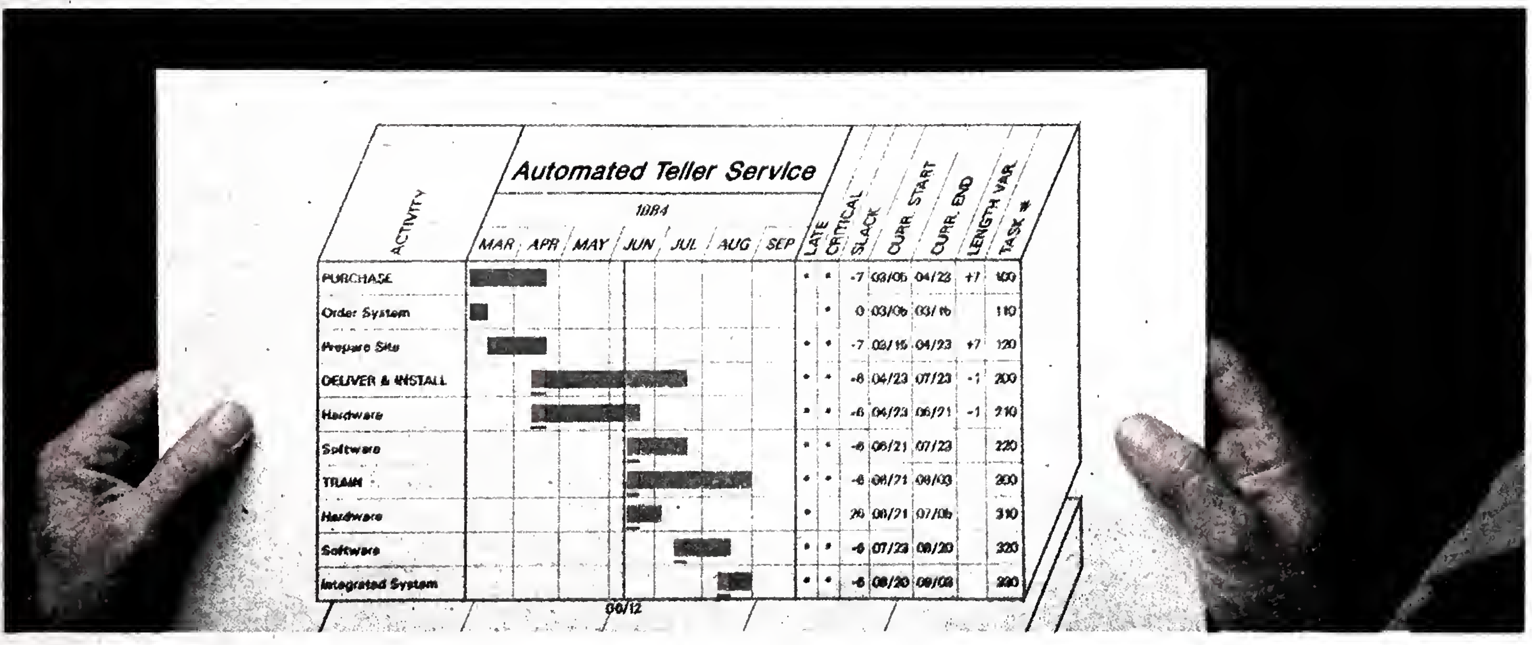

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1984

ACTIVITY	MAR	APR	MAY	JUN	JUL	AUG	SEP	LATE	CRITICAL	SLACK	CURR. START	CURR. END	LENGTH VAR.	TASK #
PURCHASE								•	•	-7	03/05	04/23	+7	100
Order System									•	0	03/06	03/16		110
Prepare Site								•	•	-7	03/15	04/23	+7	120
DELIVER & INSTALL								•	•	-8	04/23	07/23	-1	200
Hardware								•	•	-6	04/23	06/21	-1	210
Software								•	•	-6	06/21	07/23		220
TRAIN								•	•	-8	06/21	08/03		200
Hardware									•	29	06/21	07/06		310
Software								•	•	-6	07/23	08/20		320
Integrated System								•	•	-6	08/20	09/03		330

06/12

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from SR/2

nancial modeling problems. Since test data bases are frequently required in the DSS environment, a simple, easy-to-define and easy-to-use data base definition language is a requirement.

Some DSS products are designed for the mainframe environment. Good examples are System W from Comshare, Inc., IFPS from Execucom Systems Corp. and Express from Management Decision Systems, Inc.

Most current users of DSS-type software, however, use microcomputer software. The most common micro software is the ubiquitous spreadsheet, such as Visicalc from Visicorp or Multiplan from Microsoft, Inc. Integrated software packages such as Lotus Development Corp.'s 1-2-3 and Ashton-Tate's recently announced Framework will certainly sell hundreds of thousands of copies. Mainframe vendors are also moving into the micro DSS world with products such as CA-Executive from Computer Associates International, Inc. and Decision Support Software from Cullinet.

Choosing fourth-generation languages

The correct type of fourth-generation language to use for the development of an application depends on the class of application being developed, the experience of the people developing it, the workplace hardware environment and the location of necessary data bases.

■ Production applications are developed by professional DP personnel to perform the day-to-day DP tasks needed to run a business. This is the data that is needed by the organization to perform its basic functions. These are systems like payroll, accounts receivable and payable, order processing and so on.

The majority of production applications is still being developed using third-generation programming languages. In some cases, where program size and performance are very important, even second-generation assembly languages are being used. This will continue to be the case where the development cost is spread over a very large number of users or over a long period of time.

For most new application development, however, high-level programming languages should be used. They enable new programmers to develop more complex applications, and they shorten the development time needed to implement new applications. Fourth-generation programming languages and Cobol program generators are the appropriate fourth-generation language tools for these types of applications.

■ Management information systems are defined by application users and developed by professional DP personnel to use production data to generate the information needed to control and manage the operation of the organization. These are systems like personnel, general ledger, production scheduling and so forth.

For management information systems, the complexity of the problem and the degree of anticipated change will dictate the best tool. For very complex applications, very high-level programming languages in the hands of DP personnel will be needed. When the detail requirements cannot be defined and a great deal of change is anticipated, the use of nonprocedural languages will allow application users to participate in development and can result in faster implementations and greater flexibility.

If these systems become too complex for the nonprocedural language, they can then be redeveloped using a very high-level programming language. Query and report languages, information center tools or decision support systems might all be good candidates for software choices.

■ Reporting and analysis systems are decision support systems developed by application users or user specialists to use production data, management information and public data to analyze data and generate reports used to make decisions about how to run an organization.

Reporting and analysis systems should be developed using nonprocedural languages such as query and report languages, information center tools or decision support systems. These systems are frequently changed, and application users should be involved in their development.

Even when these programs are not developed by the application user, he can read the nonprocedural language and figure out what changes should be made.

JONES

from page 3

I think there's one potential breakthrough. A really rigorous analysis of reusable code reveals that the functions can be executed in parallel. When that technology begins to coincide with parallel processors in which you can have [multiple] processors executing at once, applications will no longer be executed serially.

There are a couple of other emerging technology changes that are going to affect programming, but it's premature to say whether they'll improve productivity or cause new problems. One is the emerging availability of optical disks. Another thing that's just beginning to show up is iconographic images like the [Apple Computer, Inc.] Macintosh and Lisa, which are pictorial instead of character-string-based. There's no reason why executable languages couldn't be based on icons. I see the possibility of visual-based programming languages, maybe as early as 1990 to 1995, in which you have the ability to create executable programs from a pictorial design.

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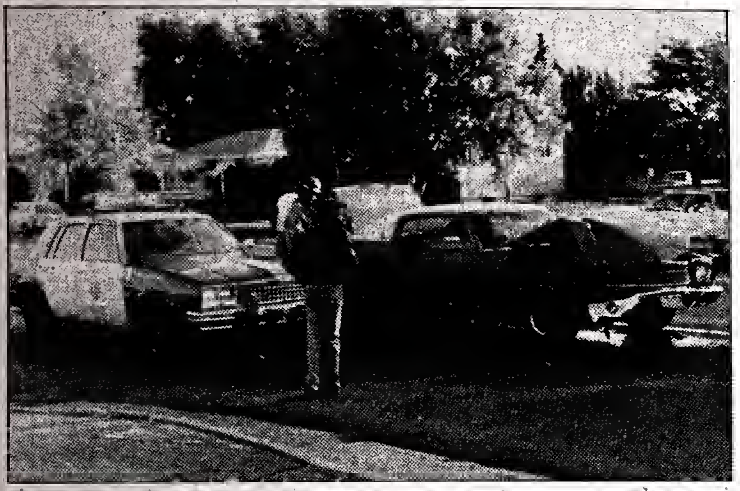
Development tool extends city's DP limits

LAKEWOOD, Colo. — For the four people who made up the data processing staff for this city, 1983 had one long, hot summer. This is the situation with which they had to contend:

- Two small, aging, 8-bit multiuser minicomputer systems, each running a dozen CRT terminals with critically poor response time and operating at — or beyond — maximum capacity.
- A growing, unmet demand by the city's staff of 350 to 400 people for greater workstation access to computer resources and for new applications.
- A proliferation of dedicated applications running on stand-alone personal computers that were not compatible with the central systems.
- A primitive Parks and Recreation Department class registration system in which enrollment was done. with paper and pencil and later entered into a batch system that produced only a few reports.
- A police officer deployment system built around data entry screens that were equally cumbersome for users to operate and for programmers to modify.
- A vehicle fleet maintenance system run in batch mode, through the mail, by a service bureau 2,000 miles away.
- A public safety (police) department master name index system manually maintained on 3 by 5-in. cards stored in a huge mechanical filing unit affectionately referred to as Godzilla.
- A historic willingness by city government to undertake one-time capital expenditures, such as a larger, faster computer, coupled with a historic reluctance to commit to ongoing costs, such as additional application development staff.



Lakewood's DP staff made it through the summer, and then a 32-bit Sequel superminicomputer was ordered from Microdata Corp. and installed in September. That system currently has 48 active asynchronous communications ports, with 40 now in use and workstations for the remaining eight scheduled to be acquired in the near future.

With computer resources in hand to serve a much larger user base and with no new DP staff being considered, Lakewood looked for ways to increase development productivity with the existing staff — a DP director, a senior programmer/analyst, a programmer/analyst and an operator — and decided to evaluate application generators.

The DP staff prepared a list of necessary capabilities in any development system to be acquired: the ability to generate compilable source code; access to records from data entry screens by cross-referencing on descriptive tags; multipart record keys; and the ability to deal with data stored in multiple subfields. It was determined that the system should be able to improve efficiency in every aspect of development and should be easy to learn, understand and use.

Initially, six development systems were considered. All ran under various implementations of the Pick & Associates, Inc. Pick operating system, one of which was supplied with the Sequel supermini. A first cut narrowed the field to three, and the final selection was The Programmer System (TPS), developed and marketed by the Software Group, Inc., of Englewood, Colo. TPS was installed on the system here 2½ months after hardware delivery.

"TPS did everything we wanted, and it's a very usable product," said Gary Svoboda, senior programmer/analyst. "The manual provides good conceptual descriptions, and we can get the details from the on-line Help feature. Also, [the Software Group] was willing to take the time to answer our questions, and that was very important to us."

Svoboda decided that the Parks and Recreation registration system was beyond enhancement and began fresh with TPS. "I used the documentation capabilities to build a complete user manual first," he said. "I showed that to Parks and Recreation

See **LAKEWOOD** SR/10

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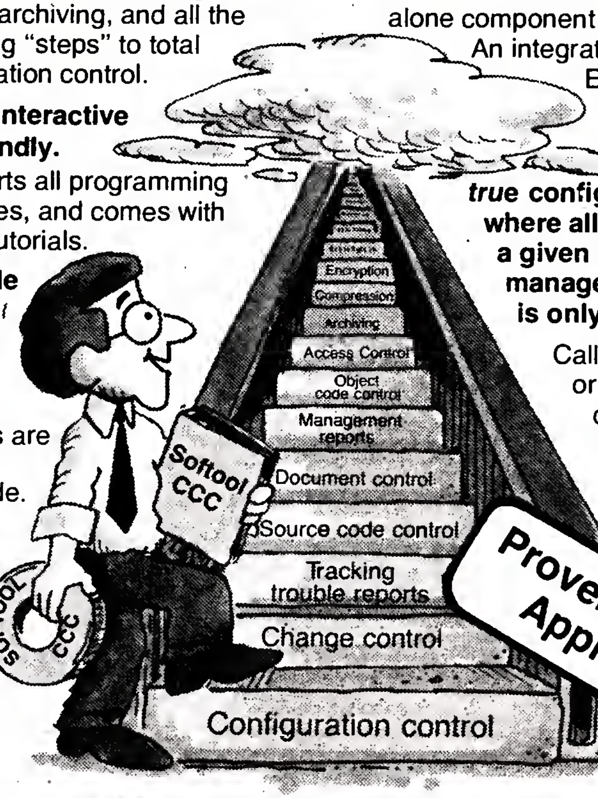

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LINE from SR/4

■ Is the tool usable by professionals and end users alike?

The language must be complex enough to meet the needs of the professional programmer, but at the same time it should be relatively easy to learn for large numbers of end users in all types of application development.

Further, it should be adaptable for personal and private computing to allow personal computers to function as programmer workstations as well as traditional personal computers.

■ Does the tool support personal files as well as standard corporate data file structures?

While the tool should support its own files for personal computing, it must not be dependent upon, nor require, this kind of file support as a prerequisite. Standard Vsam and data base management system support is imperative. Since new applications will be built primarily upon new data base and data structuring technology, the tool must be fully incorporable into these new technologies at the highest and most logical levels of support. The user must be able to exploit new technology as it arrives, without extensive and expensive conversions of existing systems.

■ Will the tool support new development technologies?

Prototyping and step-level refinement should be supported by the application development tool. In this way, you can achieve better interaction with the user during the design and testing stages of a project. These development methodologies encourage end-user participation and result in better quality finished applications. A huge percentage of today's DP budget is expended on maintenance of existing applications. Most problems with applications occur, and could be fixed, during the requirements and design stages. Thus, it is critical that these methodologies be utilized to reduce errors during the early stages. Mistakes discovered during prototyping are much cheaper to remedy than those that appear when the application is in production.

Further, a tool that can be used in the production center, the development center and the information center allows you to move applications in a step-wise manner from prototype to production. Since the same tool is being used in all three areas, such movement does not involve major trauma or conversion headaches.

■ Is the tool integrated with your normal production environment?

A fully integrated application development tool provides you with the ability to use newly created applications that are integrated with existing applications written in another software language. Add-on application development aids lack this important advantage.

Make sure that the tools you add to increase productivity are able to integrate with other tools in the production department. Fourth-generation tools need to fit into your environment and work with the security tools, monitors and so on that are already in place.

■ Will the tool integrate with decision support tools you may choose to add in the future?

A tool that is fully integrated with mainframe-based decision support tools — text editors, spreadsheets, graphics — will give you the opportunity to add such tools in the future as your needs require. Another important option is the ability to integrate your application development tool with a micro-mainframe link product, thereby giving end users the power and flexibility they need, while DP retains control of the data and standard security guidelines remain in effect.

■ Does the tool support multiple operating systems and hardware environments?

Look for a tool that operates independently of operating systems, communications monitors and hardware. Many organizations utilize different brands of hardware at different levels of the corporation. For example, an organization may use an IBM mainframe at the strategic level, where corporatewide decisions are made. At the same time, the organization may use Digital Equipment Corp. minicomputers at the divisional, or tactical, level and, say, Wang Laboratories, Inc. microcomputers at the local, or workstation, level. An application development tool should support all three levels.

If the answer to all these questions is "yes," you have an application development tool that can have a positive impact on reducing the application backlog if used properly.

The use of fourth-generation tools may not make your productivity problems go away overnight, but it can yield quantifiable results that will affect your data processing bottom line. More importantly, fourth-generation tools will affect your organization's bottom line as well.

The Goal News

For DOS/VSE Console Control

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FAQS/XP™ Console Control Shown To Be Convenient In Large And Small Shops.

Working through CICS, WESTI, VM/CMS, SHADOW, or ICCF, FAQS/XP from Goal Systems International is an on-line interface facility which offers multiple console support, console hardcopy file display, GETVIS allocation and usage display, DASD and storage display; and a VTOC display which provides an easy means to obtain VTOC entries of a device in sorted order.

In addition, FAQS/XP provides partition balancing (works even under VM), console spooling, fast printer support, a complete console archiving facility, and message highlighting.

In a single package, FAQS/XP simplifies operations, provides additional flexibility, reduces costs and increases the efficiency of any DOS/VSE system. Currently FAQS/XP is used by more than 1500 installations worldwide.

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FAQS/XP's DASD channel scheduler and Priority scheduler can reduce I/O completion times by up to 20%. Since I/O times are reduced, both CICS response time and batch throughput are removed.

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Some Companies Operate CPU's In Other States with FAQS/XP™

Many of todays data centers use distributed processing to satisfy the computing needs of their various subsidiaries. These locations are usually connected via a VTAM network, that is using CICS or CMS, to a corporate data center. Since a communications network is in place, some corporate data centers would like to either have access to the computing power that may be relatively unused at the remote location or they would like the ability to monitor system activity at remote locations in order to aid operators with various problems that may occur. This is easily accomplished with FAQS/XP's multiple console support facility.

The multiple console facility provides access to another computer's console through CICS or CMS that is connected via a communications link. All of FAQS/XP's console facilities are available (unless protected) to the remote operator or systems programmer allowing such almost total operation of the computer. "We have remote locations that submit jobs all weekend to our main computer. I no longer have to drive from Connecticut to New York City now just to cancel a job or answer an outstanding operator request" commented one user of FAQS/XP. "My wife is really happy about that, too!"

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To extend the level of control one may exercise through the console, FAQS/XP provides an interface to our job control management system — JCLMAN/XP®. This interface makes it possible to schedule jobs for execution, edit job streams, and catalog job streams that are managed by JCLMAN/XP. All functions are initiated through PF keys. Together, JCLMAN/XP and FAQS/XP represent the ultimate in local and remote console control for DOS/VSE environments.

FAQS/XP is a practical system for any on-line installation. It is one of the Extended Productivity Systems from Goal Systems International and is available for a free trial. For more information, call Goal Systems toll free today at

800-848-4640 (in Ohio 800-628-4640).

Goal Systems

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Software engineering targets future concerns

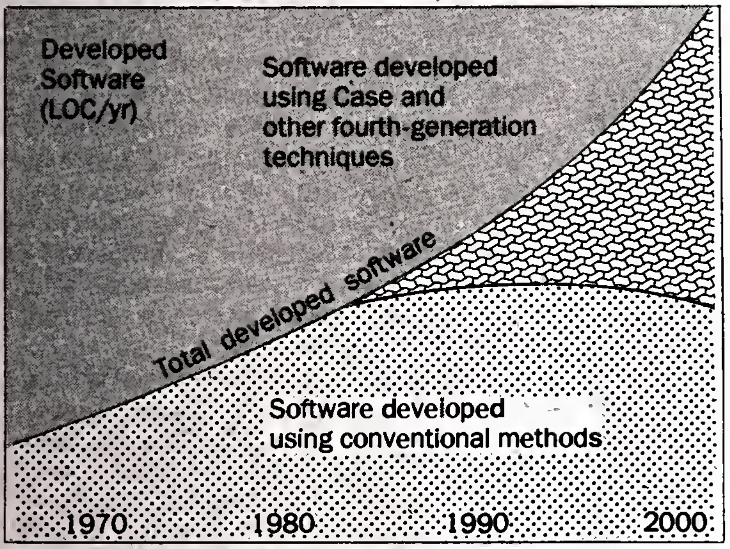
By Roger S. Pressman
Special to CW‡

During the 1970s, lagging industrial output and low product quality were collectively called a productivity crisis. In an effort to correct outmoded engineering and manufacturing techniques, many companies acquired computer-aided design and manufacturing (CAD/CAM) systems. CAD/CAM was widely adopted and is now used by companies of every size.

Pressman is president of R.S. Pressman and Associates, Inc., a consulting firm specializing in software engineering based in Orange, Conn.

Today, a new CAD/CAM is being proposed as one solution to what many refer to as a software crisis. This technology focuses on the design and manufacture of software — key engineering problems of the 1980s and '90s — and is called computer-aided software engineering (Case).

Case automates methods, controls and tools that are collectively applied throughout the software development process. By providing software project managers with control and tracking mechanisms, Case keeps development efforts on target. By enabling technical contributors to apply tools that assist in analysis, design, implementation and test, Case improves the quality of computer-based systems. Case is in its infancy, but practical elements of a comprehensive Case system are available today.



The changing nature of software development

An analogy can be made between today's Case and CAD/CAM of the early 1970s:

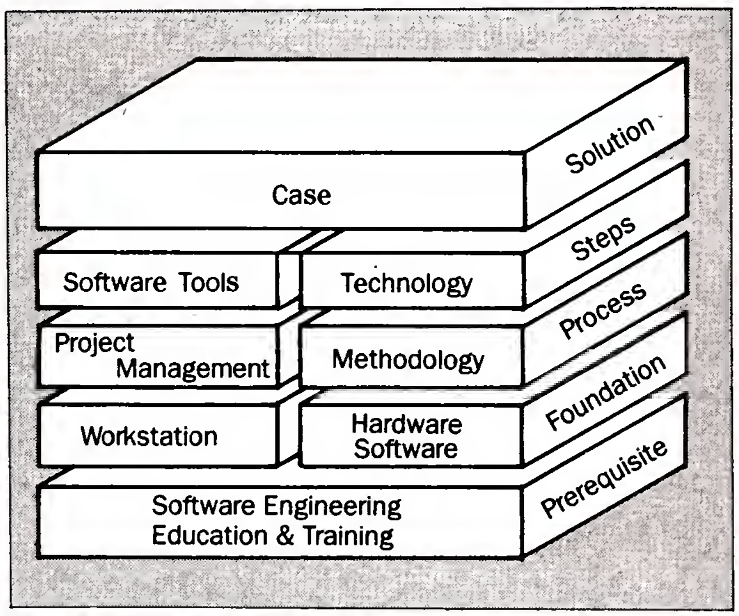
- Everybody favors it philosophically, but few use it.
- No comprehensive, integrated solution exists.
- Systems focus on the wrong tasks and often completely ignore the more important tasks.
- Technical professionals are often unaware of available systems and are unfamiliar with methods for evaluation.
- Smaller Case vendors, some of whom offer superior products, have difficulty overcoming a lack of name recognition.

The demand for MIS and engineering software will continue to accelerate throughout the remainder of this century. The rate of growth of MIS software developed using conventional techniques is slowing. Software for engineering application areas will exhibit the same trend within five years. Computer-aided software engineering will be a major contributor to these trends.

As demands for software increase and as requirements for quality and timeliness escalate, there is within the industry an increasing recognition of software engineering concepts. However, recognition and practical application do not necessarily go hand in hand. Many developers are groping for practical methods, reasonable procedures and effective tools to help them with the software development task.

With the exception of a small number of leading-edge software developers, software tools and associated programming environments are not used effectively. While all software

See **CASE** SR/12



The structure of a Case environment

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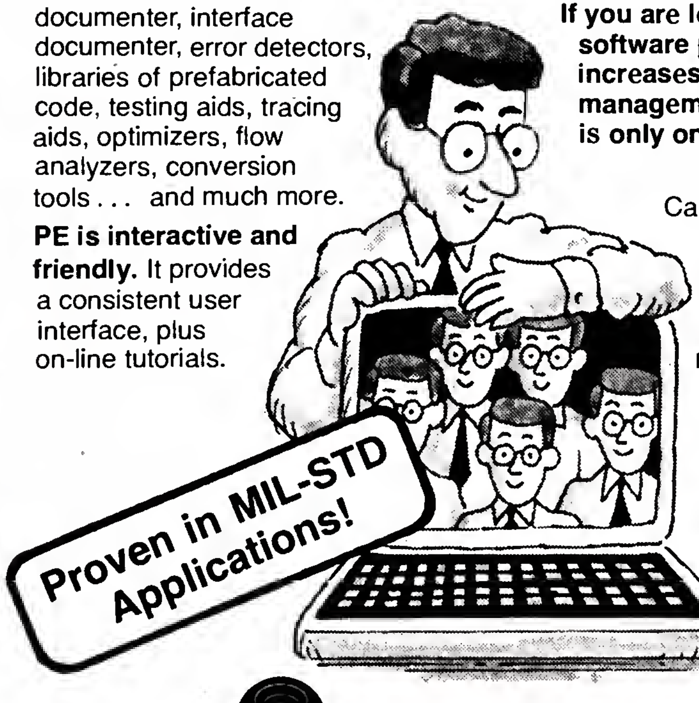
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Minicomputers — an endangered species?

Is the minicomputer the next vanishing species? At the end of a long, hot summer, *Computerworld's* August Special Report will take a look at minis and small business systems. We will look at minis in small businesses and at minis on the divisional levels of large corporations. Minis for turnkey systems and minis designed to penetrate specific vertical markets will be given a glance. There will be stories about minis used in distributed processing setups for general data processing and about dedicated minis used for transaction processing.

The Special Report will also focus on whether the minicomputer is fading away at both ends, assaulted by high-powered, multiuser microcomputers on the low end and by 32-bit superminicomputers at the high end.

Contributions to the Special Report should take one of two forms: a tutorial article discussing an issue or trend or a user application story outlining a particular firm's experience with a graphics system or package. Articles must be typed, double-spaced and range in length from four to six pages. Artwork, such as charts, graphs and photographs, is encouraged.

Authors should include a brief biography and a telephone number at which they can be reached.

The deadline for submissions to the Special Report is June 27. If you have a story you would like to tell or any questions to ask, send them to Donovan White, Special Reports Editor, *Computerworld,* 375 Cochituate Road, Box 880, Framingham, Mass. 01701.

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LAKEWOOD

from SR/7

people — it's a way of increasing user participation in development. When the Parks and Recreation staff had made changes in the manual and finally approved it, TPS was used to build the system specified by the documentation.

The newly developed system interactively handles not only class enrollment, but also tracks participation of teams and leagues using the city's athletic fields and gymnasiums.

Svoboda also worked on the awkward police officer deployment system. "The Computer Aided Resource Deployment system maintains a data base of all incidents logged, tracking by address and amount of time required. Then it uses statistical methods to project the number of calls and the amount of time required to answer them for each beat area.

"We generated data entry screens using TPS and made minor changes in existing programs so that they now use the TPS screen-handling external subroutines. The result is that everything is done in a standard way, and the whole system is easier to use and more efficient as a result."

Programmer/analyst Kip White used TPS to develop a criminal history tracking system to replace a manual system that relied on Federal Bureau of Investigation fingerprint forms and index cards. "With TPS, you still do the same things you did, but it's lightning fast by comparison. You go right from the screen to the finished program, and you can move things on the screen to change order of entry. You can modify a TPS program once it's built, but starting with a good structure with all the bases already covered helps."

Lakewood's criminal history data base currently receives about 1,000 new entries per month, and records go back to the city's founding 14 years ago.

Another instance of completely new development was the public safety department's master name index system. "This system tracks every occasion when any individual comes into contact with the police," Svoboda said.

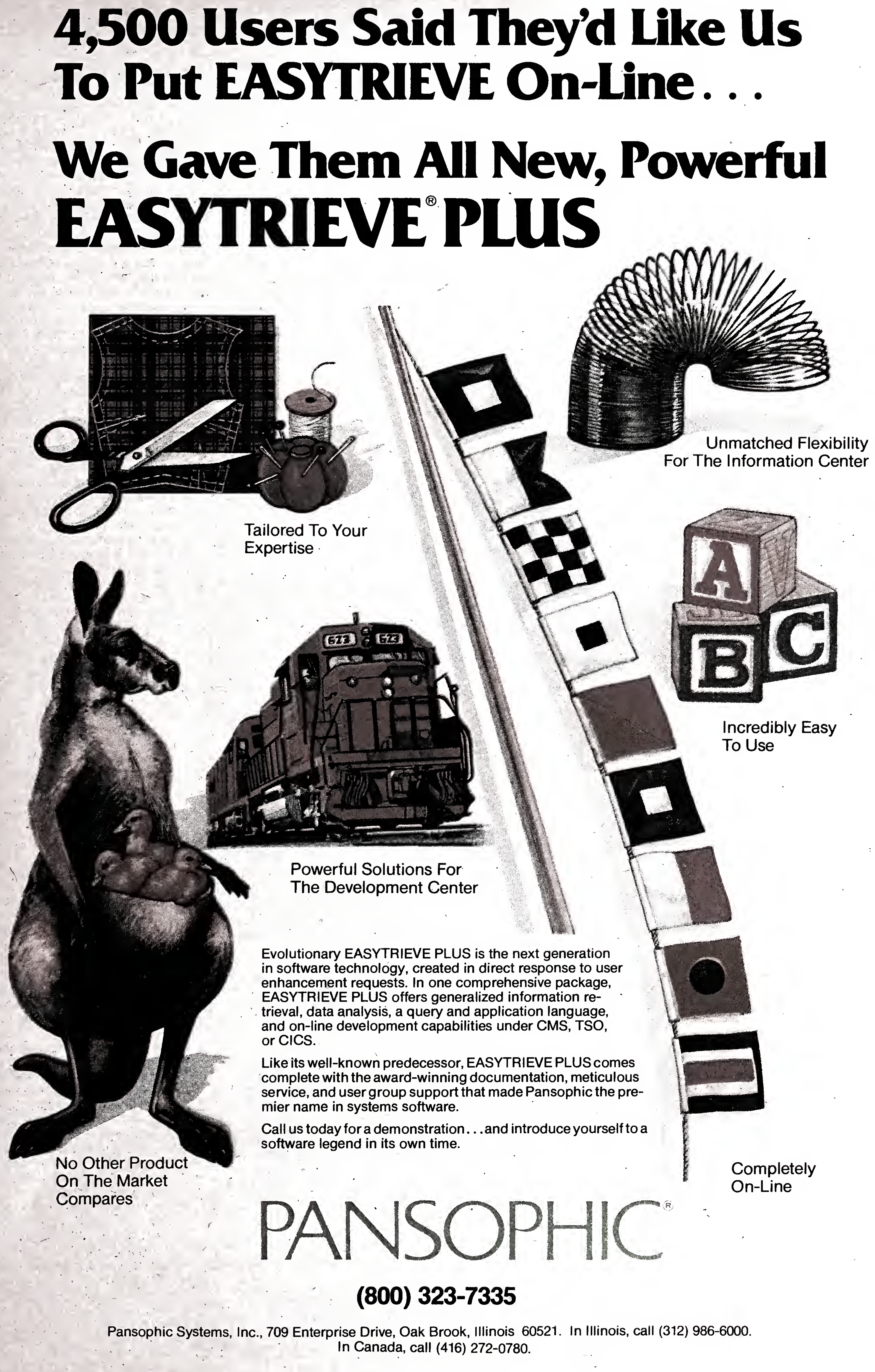
"In developing the system with TPS, we performed basically the same DP functions — but the way we did them and the time it took were very different. For instance, file creation is tied to the system documentation. That's significant to us.

Tony Mineo, Lakewood's director of data processing, said, "It makes our ability to respond to users' needs much greater. It's nice to have a programmer using initiative to develop useful systems rather than writing the same old code over and over.

"TPS develops programs in a straightforward manner; it structures everything. The productivity of technical people is utilized with far greater efficiency.

"We're selling our product; we're going to the users and saying 'Here's our computer, here's what we can do for you.' We used to balk at any request. It's nice to have the user walk in and sit down and develop a long-term schedule with you and know you can do it or beat it.

Mineo said, "It would be very difficult to go back to the [manual development] system. There's no way you could justify doing that. . . . I don't think I could stand the pressure; I'd sooner leave the business."



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CASE

from SR/9

> *As demands for software increase, and as requirements for quality and timeliness escalate, there is within the industry an increasing recognition of software engineering concepts. However, recognition and practical application do not necessarily go hand in hand.*

developers make use of coding tools — compilers, editors, debuggers — the number of developers that are actively using tools for design, specification or test is estimated to be less than 40% of the software development population. In fact, probably fewer than 10% are actually using these tools in a systematic and integrated fashion. The reasons for this dismal record are:

■ Tradition. Many developers still write programs; in too many organizations the emphasis remains on source code.

■ Insecurity. Most software developers have had little training in new methodologies. Therefore, they are hesitant to incorporate new techniques into the software development process and do not understand how tools associated with software engineering methods might best be used.

■ Human factors. Many tools that have been developed for software engineering applications are difficult to use. Rather than increase productivity and quality, these tools often increase the level of frustration and are ultimately discarded.

■ Management suspicion. Many managers do not understand how software tools or Case can improve matters and have never had a quantitative benefit demonstrated.

The key attributes of Case exist within a structure. That structure consists of education and training, used to introduce software engineering methodology; a Case workstation to provide a delivery vehicle for software tools; hardware/software support for system control functions, Case-to-host processor communications and networking; and finally, tools for project management and other software development tasks.

The entire Case system exhibits the following attributes:

■ Integrated data base. Case requires a data base that is capable of supporting integrated information and a variety of tools. That is, software development information, prepared at varying levels of detail, can be traced easily from level to level and translated from one tool to another.

Individual tools must be modular and configurable — the Case user should be able to select only those tools that are amenable to a specific application area and still be able to obtain the benefits of Case.

■ Documentation support. Extensive documentation support must be provided. Manipulation of text and graphics should be facilitated by system features.

■ Human interface. The quality of a Case system will be measured by the quality of its human interface. All tools within the Case system should exhibit a consistent user interaction mechanism and should provide a natural mode of communication between the human and the machine.

The interaction mechanism must allow an expert user to get beyond preliminaries quickly while providing guidance to the novice. Both the interface and individual tools should apply computer graphics to assist in specification, design and test representations.

■ Project management. The Case system must automatically audit the process of software development. That is, Case project management software should serve as a harness for all tools and should monitor the activities associated with the use of each tool.

The Case system should record time spent on various software development tasks, track progress toward completion of project milestones and provide data for project tracking and control.

■ Software tools. Individual software engineering tools should be capable of aiding the user in complex specification, design and analysis tasks, but should not be ponderous or complicated to use.

■ Building blocks. The Case system should provide mechanisms for creation and use of software building blocks. That is, software components that have generic applications should be cataloged and reused in other programs.

Case should encourage standardized module interfaces so that the building block approach can be realized.

■ SQA and SCM. Software quality assurance (SQA) and software configuration management (SCM) capabilities must be supported. Mechanisms for reviews, assessment of compliance to development standards and change control should all be available.

Rudimentary Case systems are emerging. No system available today offers a complete solution, but some Case products show considerable promise.

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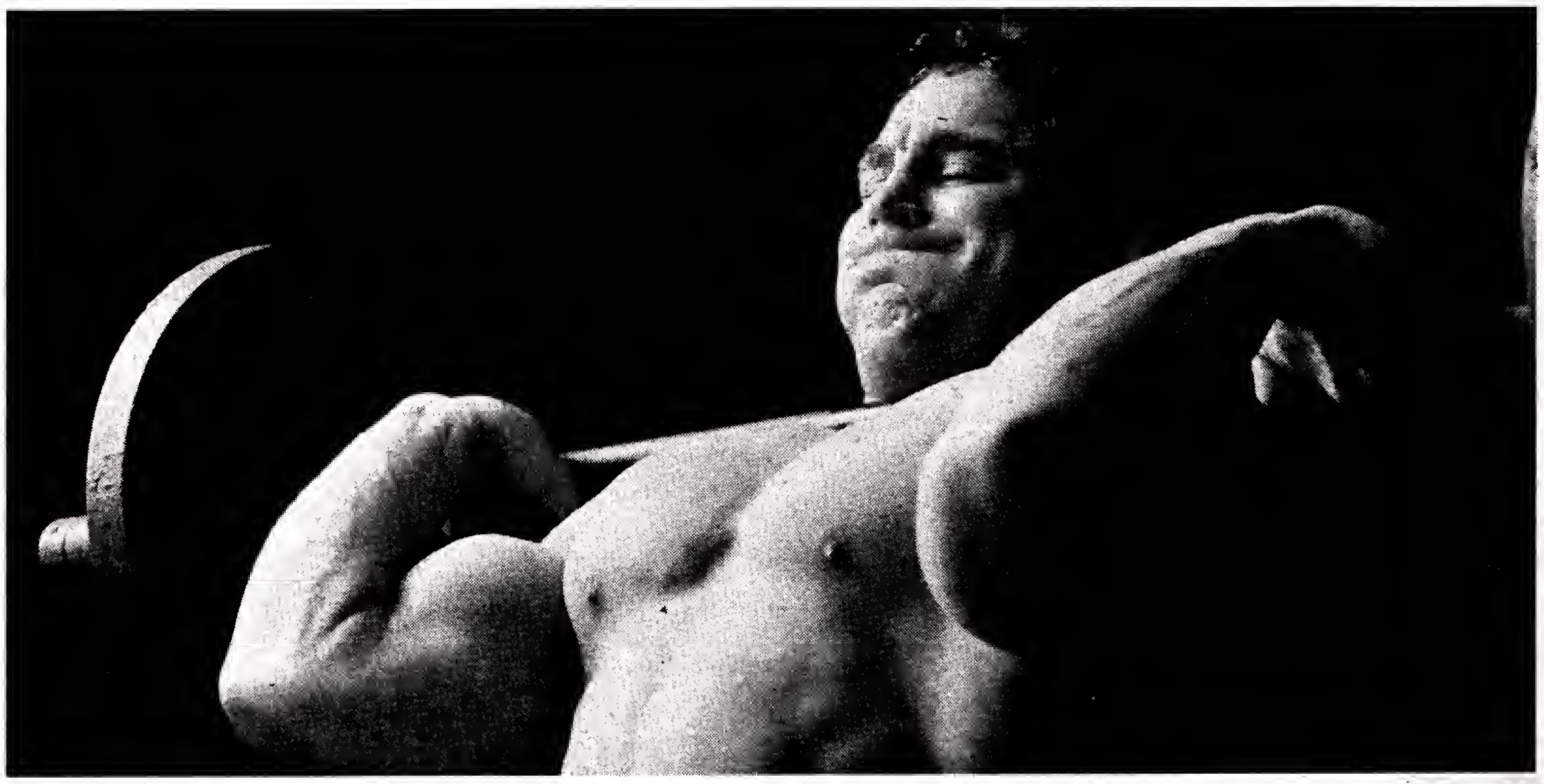

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Dial-up inquiry system helps firm's salesmen

WILMINGTON, Del. — Salesmen in the Films Division of ICI Americas, Inc. do not have to be standing next to a file cabinet in their headquarters to have instant access to important data. They can be in regional sales offices, in clients' offices, at home or in a hotel preparing for tomorrow's sales call.

In any case, they always have up-to-date information on order status and inventory because they have on-line inquiry into ICI Americas' central IBM 3081 computer through Texas Instruments, Inc. 707 Ascii teleprinters.

Prior to offering this 18-hour, toll-free, dial-up service, the Films Division could only supply its sales force with weekly hard-copy reports and the service of inside sales correspondents.

As one of the three major domestic suppliers of polyester film in the U.S., the Films Division operates in a highly competitive business environment. The division's Melinex films are used in computer supplies such as magnetic tapes, diskettes and cassette tapes and are sold for packaging, graphics, photography and a wide range of industrial applications. Serving 700 customers across the U.S., the Films Division is part of ICI Americas, a diversified chemical corporation and U.S. operating subsidiary of Imperial Chemical Industries PLC of London.

Diverse customers

"Because we deal with a diverse group of customers in a variety of markets and our products are available in a large number of grades, thicknesses, widths and lengths, each order is, in effect, custom-made," said Bruce Hotmer, sales service manager of the Films Division.

"Before going on-line, we kept our sales force up-to-date with order status and inventory reports produced every Wednesday. It was Monday before the reports were received, however, which meant the data was four days old upon arrival; this was the information that had to be used for a week's worth of calls. Simply put, the data was stale."

The need for current information required the sales force to contact the Wilmington sales correspondents, who would provide updated status reports. "But this was time-consuming and nonproductive to the salesman and the sales correspondent and, perhaps, the client," said Chris Jording, assistant director of MIS. "On the average, each salesman was making about three telephone calls each day to the sales correspondents. Because the inside representative normally had to page through more than one report to answer the salesman's questions, each telephone conversation might last an hour."

Searching for alternatives to enable salesmen to access information quickly, the Films Division asked corporate MIS to review the situation and propose a solution that would be cost-effective and would not lead to data redundancy.

No need to change data

A senior business systems analyst from MIS traveled with various salesmen for two weeks to understand and analyze their problems. From this trip, MIS determined that the Films Division needed a system that answered questions and printed hard copies of the report; there was no need to change data. In addition, the users would not have data processing training, so MIS would have to preprogram the inquiries.

First, MIS staff members decided to use Ascii teleprinters. Then they reviewed three software packages, which were already being used by ICI Americas, that could become the appropriate query systems. One was eliminated immediately because it was incompatible with Ascii hardware. At the end of the evaluation, the Films Division selected the Inquire information resource management system from Infodata Systems, Inc. of Falls Church, Va.

"Simply put, Inquire was selected because it is easy to use and easy to modify," Jording said. "Management in the Films Division explained what the sales force needed to see. We then created the prompts, as well as the Help commands, with Inquire. As each inquiry was developed and approved, it was programmed into a library so that, with one command, the salesman could retrieve instructions for using that application.

"Every inquiry is driven with an Inquire macro; users only need enter customer numbers and their own security codes," he said. "We also were able to tie this new system in to the Films Division's existing data bases to eliminate the need for data entry."

Although the two systems analysts who designed this system were novices to Inquire, the project was completed in two months.

"In that time, we evaluated the software, created the inquiries, made several modifications, demonstrated the system to all levels of management, completed a full set of documentation and received approval to order the teleprinters," Jording said.

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Incomplete, inaccurate specs the real villain

By Maureen Lampariello
Special to CW‡

The backlog of user requests common to many data processing shops is only one piece of evidence that points to the need for greater programmer productivity. The demands made on MIS divisions are great. Reasons such as rapidly changing priorities, old inflexible programs and programmer shortages are cited frequently to explain these backlogs to users and management.

While such items can and do contribute to software production problems, one of the biggest factors either is completely ignored or not recognized as the villain it is.

The lack of complete and correct specifications is the problem. All too often, project costs are estimated and completion dates are targeted before the goals and boundaries of a project are fully discussed. In the worst cases, work actually begins on program design or coding when the project is little more than a sketchy statement of a user's requirement.

One frequent result of working with incorrect specifications is, obviously, that the completed project will not do what people thought it would do. While this is an unpleasant situation, the ramifications are greater than first meets the eye.

It is safe to assume that the user will be unhappy. Users make a request, often wait a ridiculously long period of time for it to become a top priority and listen intently to reports of its progress. When enough work has been done to show something to the user, he is disappointed when the work does not meet his perceptions.

Technicians overlooked

There is another group frequently overlooked in such a scenario. The technicians responsible for the programming effort are frequently as annoyed as the user. Much thought and many days (or perhaps months) have been devoted to the project. Finding out at a rather late date that a project is not on course leads a programmer to think he has participated in a considerable amount of busywork.

After the revelation that the programs do not do what was intended, users, technicians and management frequently meet to salvage the project. They discuss more exact requirements, and programmers get busy adding lines of code or changing previously completed code to bring the project closer to the original target. More days or months pass, but at some point the user becomes satisfied with the results.

However, there lies another problem inherent in incorrect specifications. While additions or modifications are made to a faulty application, full attention is focused on the users. The users are pleased to see that programmers are devoted to their pet project. Such pleasure is, however, short-lived. Often, it is at the completion of such a project that the users realize that other projects have been ignored. Time spent redoing one project is time not spent doing other things. As obvious as this fact is, it is often overlooked in an atmosphere of crisis.

> *In the worst cases, work actually begins . . . when the project is little more than a sketchy statement of a user's requirement.*

Lampariello is an assistant vice-president of United Jersey Banks of Princeton, N.J.

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in drama of software production tie-ups

Frequently, projects out there need doing but they are not defined enough to assign to a programming staff. As a result, one of three things happens. Programmers may work on other, equally important tasks. In a less desirable situation, programmers work on projects that are lower in priority. In the worst case, programmers work on nothing.

What steps can be taken in an attempt to make specifications more accurate and complete? As is often the case, even in such a technical field as data processing, the key is people. Working with users to define the scope and purpose of a project is a real skill. Unfortunately, this skill is not easily taught or quickly learned. It is far more simple a task to teach an individual basic programming skills.

> *All too often, project costs are estimated and completion dates are targeted before the goals . . . of a project are fully discussed.*

While basking in the sun of the next successfully completed project, it would be worthwhile to identify those individuals who helped make the project a success. There are usually one or more key people who correctly interpreted user ideas and looked for answers to important questions before the issues became big problems. Such talent should be cultivated. Time is another key issue in solving the specification problem. It takes time to research user ideas and to transform them into usable specs.

Even when good people have spent sufficient time researching and planning a project, specifications may still be poor if decisions need to be made on outstanding questions.

Before technical work begins on a project, all parties involved should determine, document and agree to whatever requirements the project demands. These specifications should encompass all basic design plans. As the project evolves and new questions arise, the new questions should be answered, and the answers should be added to the original documentation.

Periodic reviews of this information by user and technical staff can ensure that the project is on track. All too often, though, documentation is left until the project is complete. There are two problems with this practice, however: the lack of written specifications may delay a project, and by the time the project is finished, those who were supposed to prepare the documentation are probably working on other things.

Admittedly, some specification shortcomings in an organization can be attributed to outside forces, such as changing, unclear government regulations. In many DP environments, however, there are internally created situations where specifications can be improved so that productivity can be improved. The phrase, "programmer shortage" may roll off the tongue easily, but the expression "specification shortage" is often more accurately the case.

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Packaged system stays the course for firm

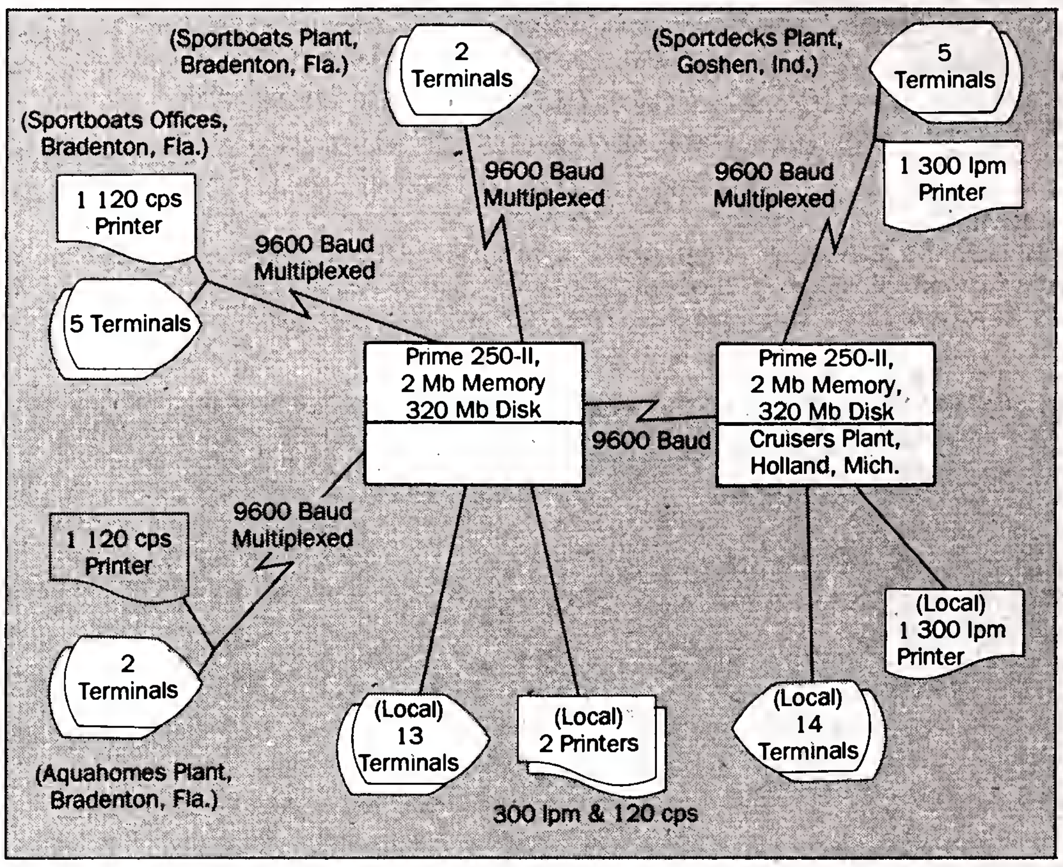
SARASOTA, Fla. — Murray Chris-Craft began considering a major upgrade of its data processing capabilities in 1981. At that time, its equipment consisted of an aging IBM 360/40, recently moved from a plant in Pompano Beach, Fla., to a site in Holland, Mich. Software applications consisted of a fairly wide range of manufacturing and accounting applications, although none of them were on-line.

It decided that an integrated, easily expanded system would be necessary in light of the expected growth of the company. That decision was a wise one, because corporate growth has, in fact, exceeded the original projections.

The U.S.' oldest boat builder, manufacturing for the last 110 years, Murray Chris-Craft is now the nation's largest, with sales expected to top $140 million this year and $220 million next year.

Since most of the company's applications were reasonably standard, it decided to try to buy a packaged system and install modifications to a limited degree.

Touche Ross & Co., a Big Eight accounting firm that maintains a DP consulting operation, was already consulting for Chris-Craft. Help from Touche Ross would be invaluable if extended into the area of the selection of the new hardware and software. A detailed search began in June 1982. At the outset, the decision was made that no application appropriate to the organization should be automatically excluded, although it was appreciated that the overall implementation plan would take quite some time to execute.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Chris-Craft DP configuration

Applications that differed from the norm, such as boat order entry and warranty handling, were identified for custom design. At this time, major modifications to existing systems were also specified.

The existing equipment was, by this point, installed and operating at the company's cruiser plant in Holland, Mich. The administrative offices, however, were located in Bradenton, Fla., and with no on-line facilities, this arrangement gave no scope for tight management control.

Chris-Craft currently operates six plants in five cities, employing approximately 1,500 people. At this time, the organization was operating, in addition to the corporate offices in Bradenton and the plant in Holland, one plant in Goshen, Ind., two more in Bradenton and plants in Swansboro, N.C., and Bellingham, Wash. The solution, therefore, would link these widely separated locations as tightly as possible while protecting the company from communications failures.

Bids were sought from several vendors, and in each case, the vendor was given free rein to configure the hardware and software in as applicable a way as the vendor's product permitted, within the overall guidelines of the request for proposals.

The configuration finally selected was a pair of identical CPUs from Prime Computer, Inc. The Model 250-IIs were to be installed in Holland and Bradenton, linked by Prime's proprietary network software, Primenet, via a 9,600 bit/sec line. Goshen was installed as a satellite on the Holland machine, having terminals and a printer linked via a multi-

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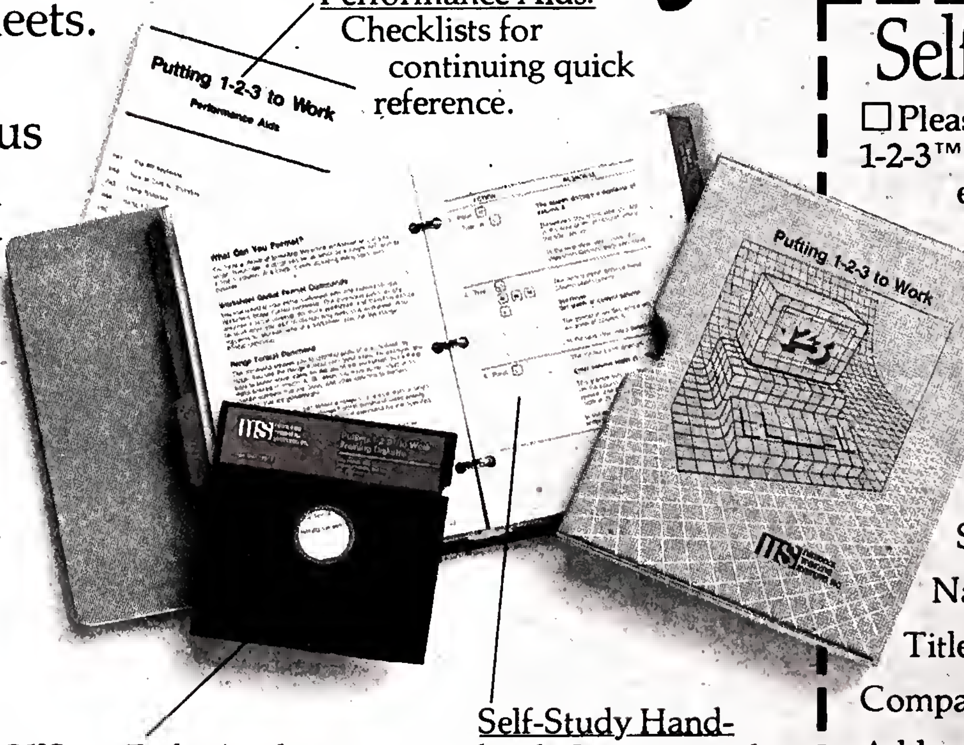

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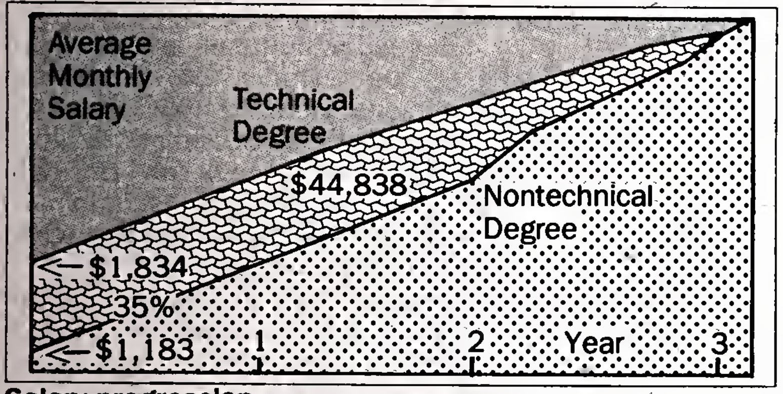
Liberal arts grads form programmer pool

Humanities, social sciences majors offer solution to high-tech's 'peopleware' problems

By Richard P. Johns
Special to CW‡

There is a vast, unacknowledged resource pool of talented people wandering in and out of the job market looking for the career opportunity they had hoped to find after college graduation. These people do not carry computer science diplomas. They carry diplomas that say English, psychology, history or sociology, to name a few.

Most of these people with bachelor's degrees in one of the humanities or social sciences are highly motivated individuals prepared for fields of employment that never materialized.



Salary progression

Needless to say, they are frustrated. Necessary to say, they are looking for a challenge and a chance to prove themselves. Many of them would like to make a career change into computer programming; some of them already have a few programming courses under their belts.

Is it economically feasible for a manager to fill a programmer position with a body carrying a nontechnical degree? The answer to this question might well be another question. Is it economically feasible not to? The cost of peopleware and software has risen dramatically over the past years, while the cost of hardware has decreased. Each year a manager can expect to see more and more of the data processing budget spent on people-related costs. Finding people to staff his shop is only a symptom of the problem. As the DP industry continues to grow and as programmer position availability increases, the turnover rate will continue to rise alongside salaries and replacement costs.

Today's managers are faced with the dilemma of having to slow down the rising cost of human resources, while at the same time meeting greater software demands. The strategy adopted by most managers to combat this dilemma utilizes a formula that goes something like this:

PROTECT INVESTMENT
IN PEOPLEWARE =
DECREASED TURNOVER +
DECREASED RECRUITING
COSTS +
INCREASED SOFTWARE
PRODUCTIVITY

The peopleware formula is practical and necessary but is limited in that it is a formula designed more to control than to remedy. The remedy lies in closing the gap between the number of positions available and the number of people to fill them. Whatever success is found in applying the peopleware formula is welcome, but it alone is not enough. There will still be software to write and positions to fill.

The question becomes one of choice. Is it better to fill an empty programmer position with a degreed, nontechnical person or not to fill it at all. Not filling empty positions can only add to the problem as well as undermine the effect of the peopleware formula. Some of the disadvantages in waiting to fill empty positions are:

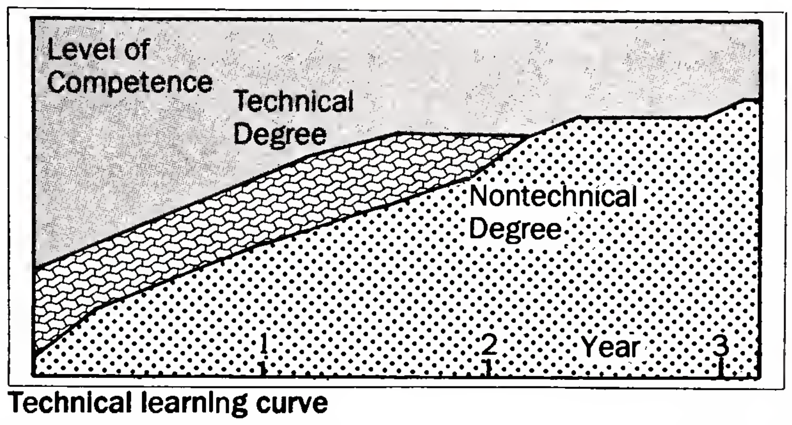
- Work overload for current staff.
- Wasted time. Time spent waiting for the ideal person is lost. That time could be spent bringing a lesser qualified person up to speed. A creative manager will find ways to make this person productive as he learns. Filling empty positions removes pressure from current staff members and has a positive effect on morale. Unless the position demands a highly specialized individual, anyone a manager hires starts out on a learning curve. When and if the ideal person is finally found, another lesser qualified person could already be a productive member of the staff, familiar with operations and well on the way toward adequate levels of technical competence.
- Project completion delays. Not only do current project due dates slip out, but the resources to take on new projects diminish. Ultimately, this inhibits the shop's growth potential.

Filling programmer positions will help close the gap between positions available and people to fill them. This in turn will do a great deal toward stabilizing runaway turnover rates, salaries and replacement costs.

While this is not a suggestion to managers to become educators in the traditional sense, it is a suggestion to provide a learning environment for certain candidates who meet some specific requirements and demonstrate an inclination toward programming. These requirements would include a four-year degree and at least six credits of computer science or equivalent experience.

Consider an educational development program where a company pays the way of an undergraduate student enrolled in a four-year degree program in computer science. The sponsoring company also pays the student for working part-time while not in school. The student is under no obligation to remain with the sponsoring company upon completion of his degree program. Since the student may or may not stay, the risk is obvious.

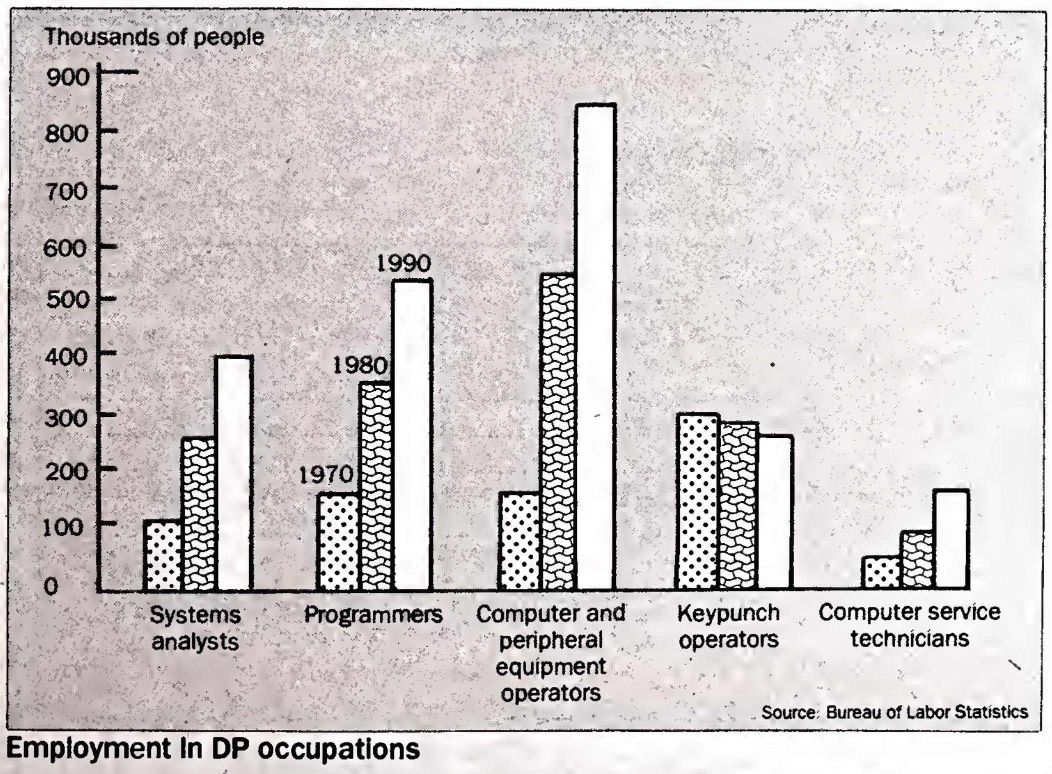
Taking this same idea and applying it to someone already possessing a four-year, nontechnical degree plus six to nine college credits in programming, changes the part-time contribution to a full-time contribution, throws away the risk that the student may take his free education and go elsewhere and results in a much better sounding deal.



Technical learning curve

Trimming down the peopleware-software budget is a desirable goal for all managers. The main reason for filling an empty programmer position with a person who holds nontechnical degree should not be to save money. The main goal is still the highest level of quality for the lowest possible price. It is important to recognize that by filling an empty programmer position with a person who holds a nontechnical degree, a manager will not lose money. In fact, in many cases a manager can save money without sacrificing quality.

New hires with computer science degrees have two main advantages over new hires with nontechnical degrees. With a broader exposure to software development techniques, the new hire with the technical degree should be capable of designing software sooner.



Source: Bureau of Labor Statistics

Employment in DP occupations

These advantages, from a manager's point of view, buy him additional technical productivity sooner. The key word here is "sooner. Finding ways for new hires to be productive immediately will buy a manager additional technical productivity. This includes new hires with and without technical degrees. A programmer has many responsibilities, some more technical than others, some not technical at all.

Passing some of the lesser technical responsibilities to new hires would accomplish three things:

- Experienced programmers would have more time to concentrate on technical problems of greater difficulty.
- New hires with nontechnical degrees could be productive as they scaled the learning curve. Contributing to productivity is an excellent momentum builder and will help new hires assimilate more quickly.
- Improved technical productivity would result.

Does a programmer with a nontechnical background have advantages? All things considered, the answer is yes. Traditionally, technical competence has received most of the emphasis, but technical competence is only one dimension of the successful programmer. An outline of four major competence groups follows:

- Personal competence.
- Technical competence.
- Communication competence.
- Company-specific competence.

Although technical competence is a major component of the successful programmer, deficiency in any of the other competence areas decreases a programmer's effectiveness. Lacking any of these competences implies a learning curve.

There is no particular advantage for one degree type in terms of either personal competence or job-specific competence .

Inasmuch as the person with a technical degree has the advantage in the technical competence group, the nontechnical degree holder has the advantage in the communication competence group because of broader exposure to oral and written communication. This, of course, is the general rule; exceptions in either case exist.

There is no advantage in waiting for the ideal person to come along. Accepting the challenge to develop a lesser qualified person with potential will yield far better results than waiting. Viewing people with nontechnical degrees as possible solutions to the peopleware-software problems of the '80s will prove beneficial.

Johns is a software engineer for Texas Instruments, Inc. in Austin, Texas.

Don't judge a programmer by expertise alone

By Richard P. Johns
Special to CW‡

Inasmuch as there is always a risk involved in hiring new programmers, it must be assumed that the risk is greater when hiring people with nontechnical degrees. Just how much greater is a speculative question at this point, and until more people with nontechnical degrees are tested, no accurate percentage can be offered. But based on what we know about successful programmers, we can develop a set of guidelines for selecting promising candidates with nontechnical degrees.

> *Beyond a minimum level of intelligence and technical knowledge, it is the personal characteristics of the individuals which differentiate good and poor performers on the job. Therefore, emphasis should be placed on these characteristics when recruiting and interviewing.*

The following list of attributes is taken from a 1981 report titled "Individual Contributor Competencies in Software Development" by Maryann Fisher, then a doctoral intern at the University of Texas in Austin. The list identifies the 10 most important attributes for success as rated by managers.

Ten most important attributes

- Willingness to accept responsibility.
- Thoroughness.
- Persistence against obstacles.
- Ability to be a self-starter.
- Ability to communicate.
- Resourcefulness.
- Responsibility to fulfill promises and commitments.
- Enjoyment of the work.
- Self-confidence and assuredness.
- High standards.

What should be immediately apparent about the list is the absence of any reference to technical ability. However, because programming is a technical job, this attribute list assumes an adequate level of technical competence. Nonetheless, this list reveals that most attributes reflect personal characteristics. The report recommended that:

"Beyond a minimum level of intelligence and technical knowledge, it is the personal characteristics of the individuals which differentiate good and poor performers on the job. Therefore, emphasis should be placed on these characteristics when recruiting and interviewing."

Based on two sets of interviews in this same study, the particular characteristics that emerged in the good performers showed that they:

- Seek challenges in their work.
- Feel that their work is important.
- Have high initiative.
- Are good problem solvers.
- Are open-minded.
- Keep current in the field.
- Are long-term planners.
- Have a high level of interaction with others.

These same traits are contained in the following set of guidelines by which to select promising candidates with nontechnical degrees:

- A four-year degree. Success in a four-year program is a good indicator that an individual has the skills and the stick-to-it attitude needed to develop technical competence.
- Six to nine credits of programming or equivalent experience.
- A search for challenges in their work. Strong candidates enjoy working on problems that deal with the unfamiliar.
- The feeling that their work is important. How does the applicant feel about the job for which he is interviewing?
- High initiative. Has the applicant gone beyond the standard requirement of a resume or an application in terms of presenting himself?
- An ability for solving problems. How is the applicant solving the current problem of changing career fields? Has he designed a solution with a series of steps toward solving the problem?
- Open-mindedness. Is applicant interested in the suggestions the interviewer might have to offer?
- Currency in the field. Does the applicant read magazines to stay informed? Does he attend seminars? Read books?
- Long-term planning aptitude. Does the applicant know where he's going in a general sense? Has he thought about it?

Johns is a software engineer for Texas Instruments, Inc., in Austin, Texas.

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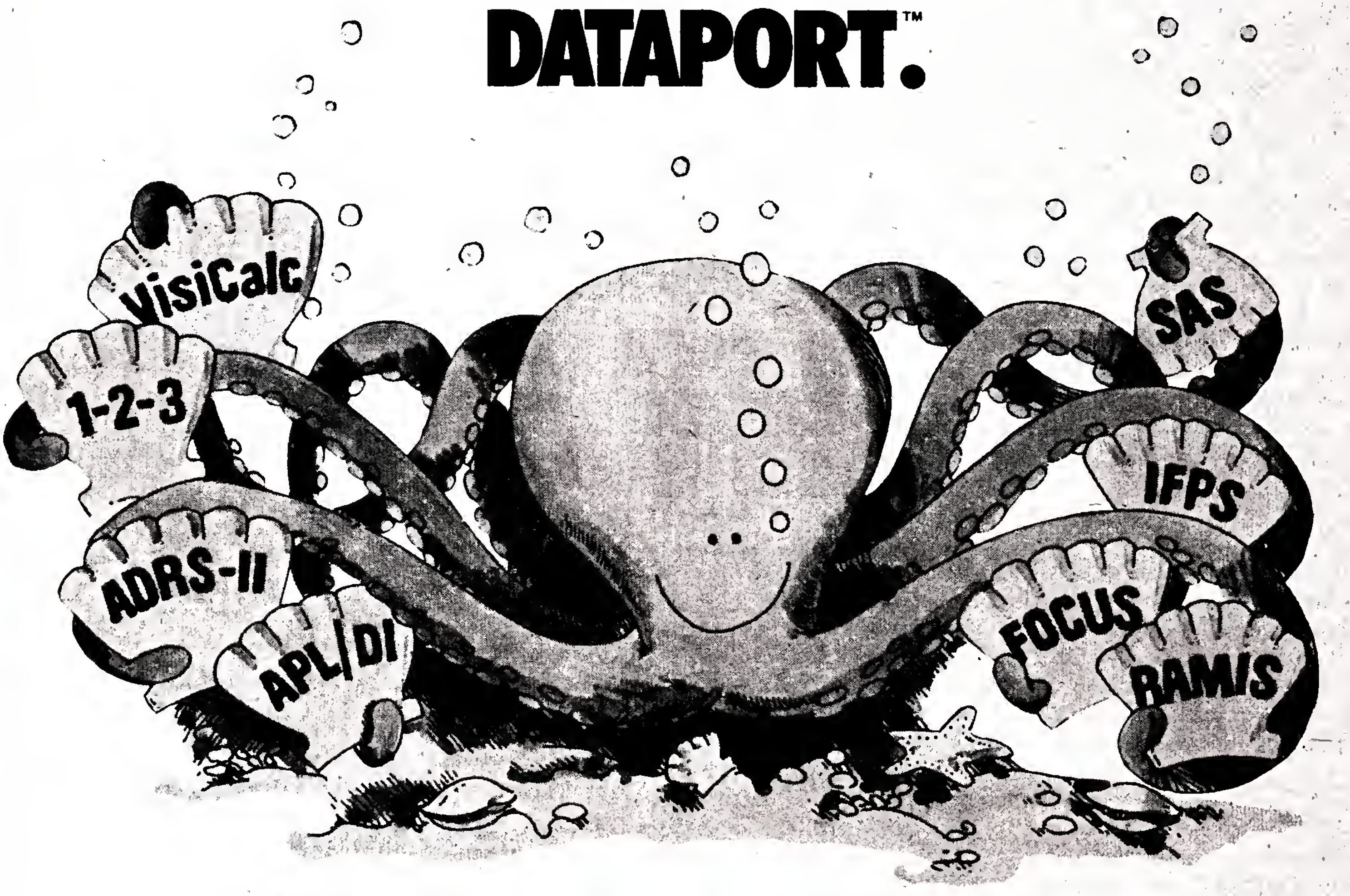

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Buddy system helps new hires swim, not sink

In order to make the best use of the new programmer, especially one with a nontechnical degree, a manager must find ways to help him become productive immediately. A creative manager should be able to put together a list of tasks that vary in their degrees of technical difficulty.

Assigning responsibility immediately is a great way to bring out the best in a person. Some might call this the sink-or-swim theory. The new hire who has what it takes to be successful will not sink. The success-bound new hire in over his head will seek out the information he needs to get the job done. As long as the necessary resources are available and the new hire is aware of these resources, the sink-or-swim approach is a tough but fair test.

The manager must determine as soon as possible whether the risk taken in hiring a person was a good or a bad one. It is up to the manager to decide what task best suits the new hire's background and to allot him plenty of time to complete it. Speed will come with experience.

Hands-on participation

The concept of learning by experiencing, or hands-on participation, is nothing new. It exists to some degree in almost every job situation imaginable. Whether it is structured and formalized is a different matter. It suffices to say that any on-the-job training is better than none at all.

The best type of on-the-job training is the teaming of an experienced programmer with a nonexperienced programmer. The experienced programmer more or less becomes the mentor. He should be patient, knowledgeable and willing to accept the challenge of developing a new programmer into an asset, not only to the company, but to himself as well.

The new programmer should spend a large portion of his time alone working on a task for which he is personally responsible. When he reaches a snag, it is his responsibility to seek out the information he needs. There is nothing wrong with not knowing the answer. The ability to distinguish between wasting time and being independent is important.

Part of a new programmer's time will be spent with his mentor working out problems that go beyond his experience level. It will not take long before the experienced programmer and the new programmer understand each other's needs. By working together, they learn to be greater assets to one another.

Working with an experienced programmer will do more to develop a new programmer than any other single thing. As time goes on, the new programmer begins to contribute more and more to the team effort. In doing so, he becomes more independent, and his ability to handle larger portions of a project on his own increases.

A new hire can be productive as he scales a learning curve. All shops are not the same, and it is up to the individual manager to come up with innovative ideas best suited to fulfilling his needs. A good way to find such ideas is to seek out ways to relieve pressure in other areas. New hires can be kept productive by doing:

Working with an experienced programmer will do more to develop a new programmer than any other single thing. As time goes on, the new programmer begins to contribute more . . . to the team effort.

■ Code reading and flowcharting. Taking a piece of code, reading it and then flowcharting it is a good way to learn the coding techniques of other experienced programmers. Programmers are not always familiar with the code they must debug. Picking up an unfamiliar piece of code to debug and flowcharting it can save valuable time in a busy shop. It may even provide a way for the new hire and the more experienced programmer to work together.

■ Team debugging. A new hire can learn a great deal about software and hardware environments by assisting an experienced programmer in debugging a piece of code. The experienced programmer can navigate by making the decisions and determining strategy; the new hire can start by examining listings and handling keyboard interactions.

■ Code documentation. Poorly documented code is a problem. A new hire can go in and add comments to undocumented code.

■ Testing. Much of the programmer's time is spent testing software. The new hire can run tests and possibly design and code them. This frees time for the experienced programmer, while providing another way for the new hire and the experienced programmer to work together.

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UPGRADE

from SR/16

plexer and 9,600 bit/sec leased line. Bradenton similarly carried its two local plants via leased lines.

For software, an integrated system produced by Systems Management, Inc. (SMI) of Rosemont, Ill., was selected.

Dave Simmons, director of MIS, said, "We needed to get something in the area of a report writer, but also something that would allow management to do some projections, to perform some financial modeling, company modeling or capacity modeling."

An important part of the initial discussions addressed the cost of proposed modifications. The inclusion of the resulting specifications in the contracts did not wholly prevent later disagreements, but it did at least keep them at a manageable level. All too often, misunderstandings between the vendor and the customer have been known to lead to an unsuccessful implementation or, occasionally, material damage to one or both parties.

As an interim measure, Chris-Craft decided to transfer the accounting applications directly from the IBM to a service bureau near the administrative offices and leave a limited number of manufacturing subsystems on the Holland IBM system.

Sequence of implementation

At the time, consideration had already been given to planning the sequence of implementation. Implementation is a function of the nature of any given organization, and Chris-Craft's sequence was neither more nor less typical than any other. However, emphasis was, of course, placed on those departments where the most immediate need lay — either from the standpoint of efficiency or, in some cases, because of importance for management control.

Suitable rooms had been prepared, and the machines were delivered and installed in December 1982 and were operating the first few self-contained applications within two weeks.

The first major areas brought on-line were accounts payable, purchase orders and receipts processing. Since the purchase order system had been freshly modified and because of inexperience with this type of on-line software, some problems were encountered at first. Chris-Craft learned the lesson that all new users quickly face: Some desirable modifications were simply not worth the cost.

As a result, procedures had to be adjusted, although at no time any compromise was permitted to jeopardize the operation of a key department.

The next critical area to be addressed was the general ledger. The company's fiscal year ends in August, and as a result, it planned to load the balances as of the beginning of the next fiscal year. Despite careful preparation, the task was a lengthy one.

The ledgers — one for each of the corporate entities in the organization — were processed at a local service bureau, and it was not feasible to transfer the data via tape or other automatic media. As a result, a large manual effort was involved, and it took several months for the on-line system to replace the bureau operation completely and also reflect current activity. As soon as the general ledger was up to date, an immediate benefit accrued — the accounts payable and purchasing/receiving systems were interfaced to post automatically to the ledger.

There are currently six staff members involved directly in Chris-Craft's data processing, covering all locations. These provide training and support to the users, technical support for the machine and software and also leave some slack to provide a small amount of in-house software. Peter Ruscoe, DP manager, said, "I think the thing that excites me most is that our organization is known for rapid growth. In this context, our combination of hardware and software gives us an almost unlimited upgrade path by the use of multiple CPUs in a network."

Acceptance by the user community has generally been very good. Employees have a positive attitude about their work, and this extends to the DP portion. At present, a relatively small number of people are directly involved, but as further systems are installed (inventory control, order entry, billing, accounts receivable, payroll and personnel), fast progress is expected toward a healthily automated operation.

Linda Pearson, accounts payable clerk, said, "Before we had this system, there was a lot of writing involved [to prepare data for the service bureau]. Now there is almost none. I feel that more planning and investigation would have given us an even better system. More time spent discussing the system with the clerical staff involved might have avoided more problems. Nevertheless, a lot of improvements have been made — I think we are headed in the right direction."

Very shortly, Chris-Craft will double its hardware capacity and add further users, both within the present organization and also in other arms of the company as resources permit.

Simmons added, "The importance of preplanning cannot be overemphasized." Adopting a packaged approach (albeit with numerous modifications) gave Chris-Craft a fast start-up, a security blanket in the shape of the vendor and a cost proportionate to the complexity of its ambitions.

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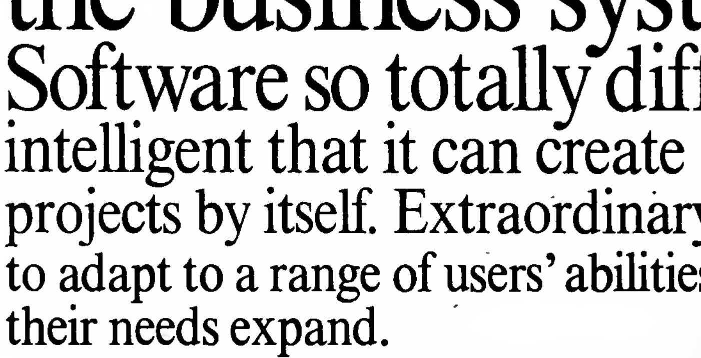

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Firm hits rough seas in productivity quest

One problem that occurred was caused by the lack of a particular type of documentation. No information was supplied that identified exactly from what source an automatic general ledger posting came.

Murray Chris-Craft did not encounter smooth sailing all the way. There were some rough waters as it voyaged to productivity.

One problem that occurred was caused by the lack of a particular type of documentation. Some time earlier, the company had received the user guides for the entire vanilla portion of the system. However, these were only slightly more informative than the operational screens themselves. In particular, no information was supplied that identified exactly from what source an automatic general ledger posting came.

At month's end, it became difficult to verify and balance the ledgers. This situation was rectified recently, when Systems Management, Inc. supplied a detailed description of all the automatic general ledger transactions produced by the system.

Chris-Craft's introduction of the production work order system to the plant in Holland, Mich., was concurrent with the implementation of the general ledger system. Because of the nature of the product in the Holland plant (cruisers from 25 feet to 42 feet long), one boat can stay on the production line quite a long time. Too long, certainly, to permit the issuance of all components at the same time. The importance of good inventory control and the challenges that had to be met before it could be implemented delayed its planned implementation until the present.

A problem yet to be resolved concerns system breakdown. The company currently backs up its data bases daily. (Software, which until very recently was an exact copy of that held by vendors, is backed up less often). Nevertheless, should there be a momentary power interruption, say, shortly *before* a backup, then the company is not in a good position to recover without restoring from tapes 24 hours old.

Thunderstorms common

In the Bradenton, Fla., area, such power problems are all too common during thunderstorms. The situation is aggravated by tight links in the application software — it is almost impossible to isolate a subsystem and restore that alone. Until recently, judicious inquiries on the data following power restoration would indicate what data, if any, had been lost. However, this will not be nearly as obvious when long-running batch programs affecting inventory are interrupted. Some solutions being considered include incremental dumping, improved audit trails (for manual recovery) and file integrity-checking software.

The production work order subsystem has one overall problem — that of required resources. The design of the software is such that many functions use Prime Computer, Inc.'s batch processing feature. This, in essence, runs one or more background streams, with jobs initiated by on-line programs via menu selections. All reports produced by the system are generated in this way. Thus far, the company has not devised an effective way of scheduling the batch jobs.

The system is effectively limited to a single batch stream, and the batch processor has no mechanism for automatically deferring certain jobs until off-peak hours (the system runs 24 hours a day, 7 days a week, but there is no formal split-shift use of the terminals). Jobs can be held and released manually, but this would require a full-time operator — a position Chris-Craft does not wish to provide. A resource quota system also exists, but the result of exceeding one's quota is cancellation of the job — an unacceptable course of action.

software that links

Only innovation can dam the backlog flood

By Lance Ohl
Special to CW‡

In data processing departments throughout the U.S., and most likely throughout the world, development groups are fighting a deluge of application backlogs. Despite the work of vendors and users to develop effective solutions, their efforts can be likened to patching the leaks in an old dam.

New, innovative technology is needed to solve the problem of application backlogs. Many of today's most effective technological advances are the result of pure research effort, using the best available technology and not relying on preconceived methods of solving problems. Software developers need to be given the time and resources to step back from the problem, to look at the "whys" and "hows" and to research available technology, see what works, what does not work and apply the results of their findings.

Eighty percent of systems are functionally consistent, or generic, leaving only 20% that are not consistent — a concept that has not been explored in systems development.

More and better tools are needed to stay abreast of advancing technology as well as growing development needs. Advancements in hardware and software have opened a multitude of possibilities for better, faster, more sophisticated productivity tools.

Technology available

The technology is available to blend hardware and software to produce faster, more responsive machines for the end user. With software embedded in hardware on a chip, system functions are performed faster with less overhead required, thereby increasing productivity.

These concepts can be applied to many aspects of system development. Low-level normalizer modules can tell the system how to perform specific, generic functions. Cobol can then be written above the normalizer modules to tell the system what to do. If the normalizer modules could be coded directly into the hardware — on a chip — that would mean less overhead required each time a function is performed, and response time could be improved by 50% to 60%.

With less reliance on bits and bytes, application development has been opened up to include proficient end users who know the "whats" of system development but not the "hows."

'Unlimited possibilities'

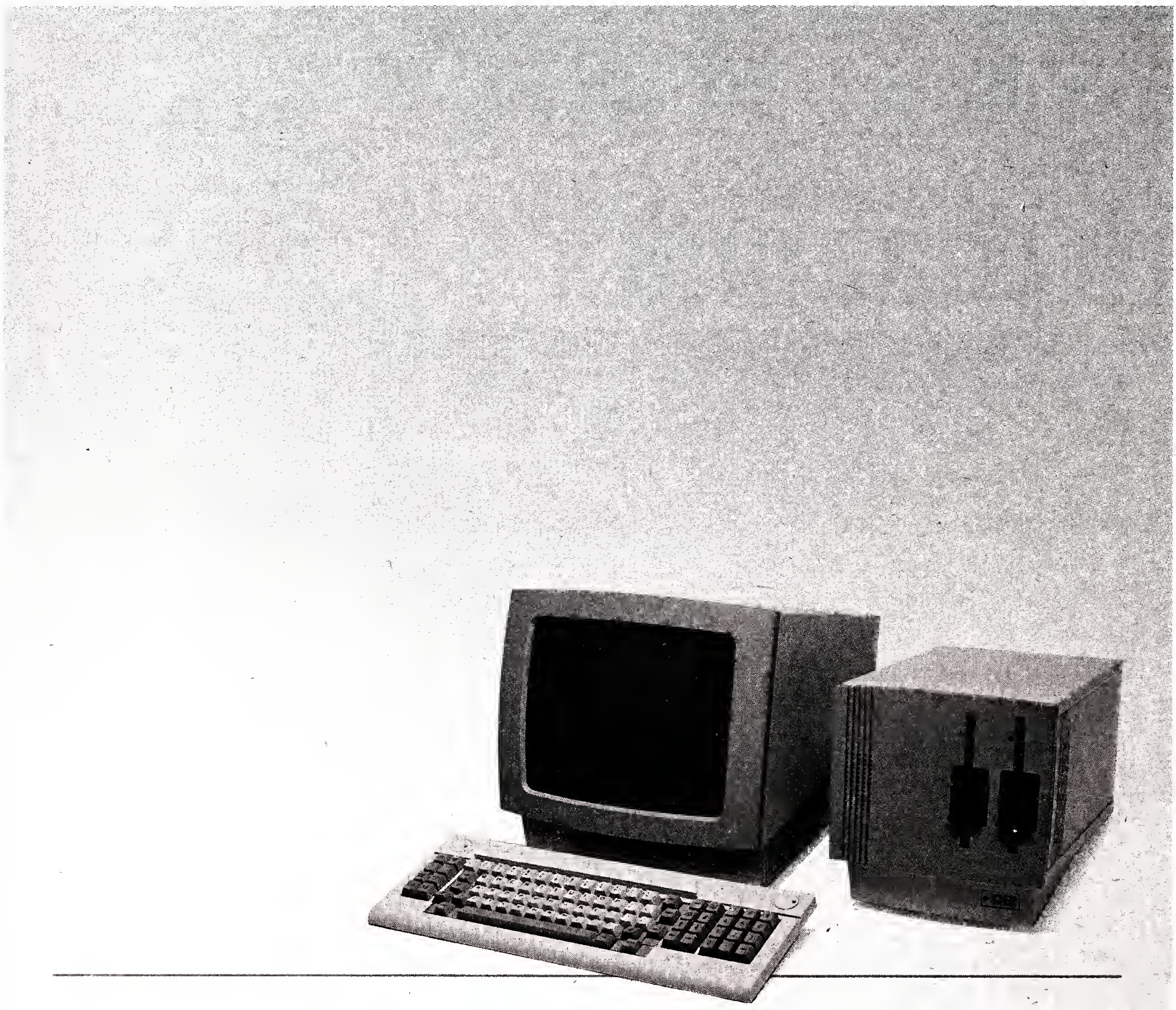
Already, we are seeing a blend of hardware and software on the IBM Personal Computer, from Basic on a chip to the many applications that include software and an expansion board. If this capability is made available to mainframes, the possibilities for faster, more effective development methods are unlimited.

Professionals in the fields of science and engineering have long recognized the value of stepping back from today's problems and looking to the future for solutions.

The application backlog is not going to be beat with more of the same technology. The rapidly maturing software industry is reaching the point at which it must support this type of research in order to overcome the demands that arise from the introduction of new technology.

We must be open to radical new methods and use the resulting information to our benefit.

Ohl is director of Millennium support and development for McCormack & Dodge Corp. in Natick, Mass.



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24	Atlanta, GA
September 4	Los Angeles, CA
6	San Francisco, CA
12	New York, NY
18	Washington, DC
26	Philadelphia, PA
October 2	Atlanta, GA
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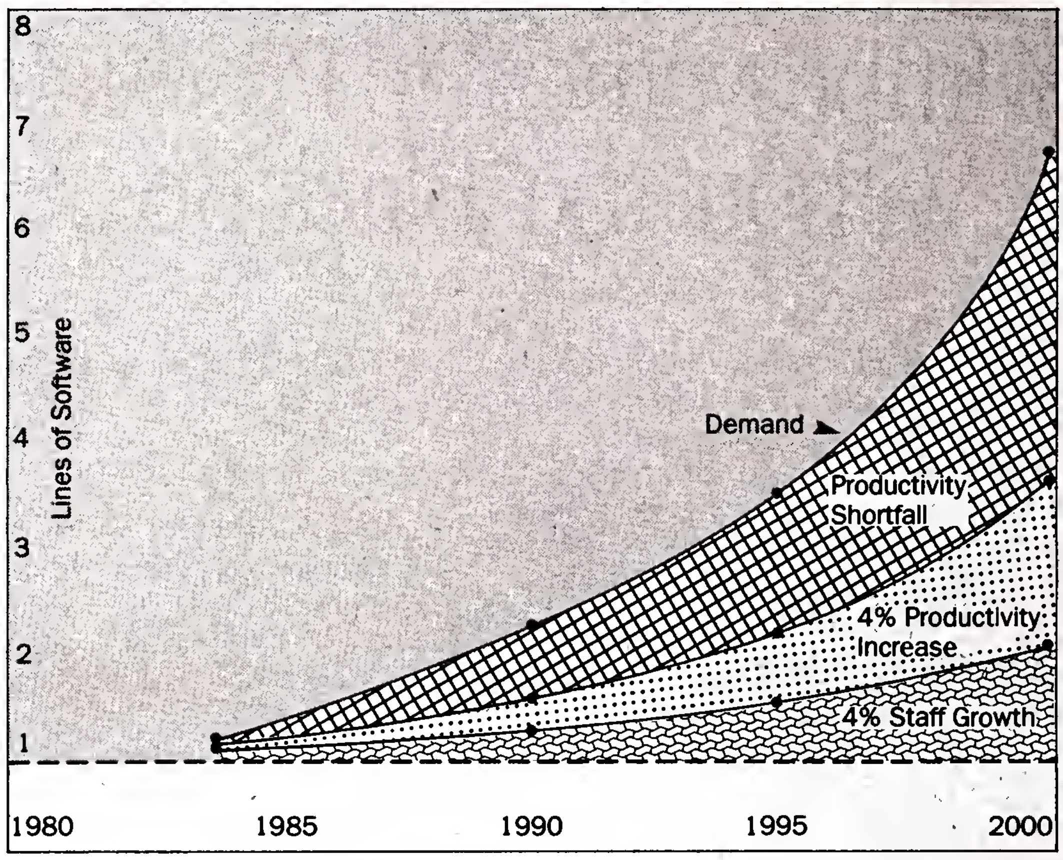
Software technology lagging behind hardware

Consolidation, evolution, revolution needed to bring it up to par

By John B. Munson
Special to CW‡



Industry ability to create software

For better or worse, the Western world has chosen to rely increasingly on computers. And the computer industry has responded by developing a virtual continuum of more powerful machines. It has been a remarkable progression matched only by an accompanying steep decline of costs.

At the same time, we are implementing increasingly complex functions in software to execute on these computers, but the technology of software has not advanced nearly as far as that of hardware. And because software is still an emerging technology, the costs, the performance levels and the management problems involved in implementing a function in software continue to be high.

How do we go about increasing software productivity enough to make a difference? There are three strategies for improving both software productivity and quality beyond this range. Each strategy will have an effect in a different time period.

■ Consolidation. Apply existing tools to software development projects. Many tools have been developed which, although not integrated, can provide immediate improvements. Consolidation will have an effect today. Consolidation should readily and immediately yield improvements of 25% in productivity and up to 50% in quality.

■ Evolution. Provide integrated tool sets to aid and support the software engineer so that he will be able to produce an improved product more efficiently than he can today. The evolutionary strategy will affect system development and support several years from now, and should yield improvements of 50% to 300% in productivity and up to 100% in quality over that typically found today.

■ Revolution. Fundamentally change the software engineering task. Develop methods and tools so that the engineer does not have to write each line of code anew for each application. In one way or another, software itself must be used to write the bulk of the applications, and the users, rather than the programmers, must determine the design of software systems. The revolutionary strategy requires more elapsed time to take effect, but it could yield improvements of up to 1,000% in productivity and two to four times in quality.

The objective of consolidation is to apply more widely the software support facilities that already exist; for example:

■ Better quality hardware. Increase videoscreen size, resolution and display/redisplay speed. More computing cycles allotted to each programmer to speed up the way in which a programmer can peruse and interact with existing code, prose and data.

■ Improved software tools, including high-level language compilers; microcode compilers; screen editors; on-line, source-level language debuggers; configuration management documentation systems; and word processing.

■ Better expression media. Increase the functionality that the programmer can express in one statement through use of higher level coding languages and program design languages.

■ Better methods. Train the current staff to use modern methods and provide support for those methods to the practicing programmer. Tools exist today to support many of these existing methods.

The evolutionary strategy requires coalescing and integrating tools into a coherent engineering support environment. Integration is the key to the evolutionary strategy; this is in contrast to the use of isolated existing tools during consolidation. Productivity and quality can both be improved if the output of one tool is suitable input for another tool.

Evolutionary development techniques that could be applied within an integrated environment include:

■ Reusing software where possible. As in other trades, individual programmers have a style of working that causes them to do similar things in the same way as in the past. This provides the opportunity for a programmer to maintain libraries of small reusable units of software. If these libraries can be shared across a project or several projects, both productivity and quality are enhanced.

■ Rapid prototyping. Rapid prototyping is a technique for evaluating concepts prior to full system implementation. It can also be used for quick implementation of selected elements of a system for the purpose of reducing risk. On the surface, prototyping appears to be a redundant effort, but it yields substantial productivity gains from a clearer understanding of the vital requirements baseline.

With rapid prototyping, full system development can proceed more rapidly with fewer people, thus achieving a net cost reduction. Prototyping also allows senior personnel to contribute directly to critical software design problems.

■ Automating the production of program documentation. Much of the software engineering task involves documenting the design, the program interface or the program internals. We know today how to produce documents for a variety of restricted situations automatically. We can automate the production of pictures that capture the structure of complex data representation or capture the flow of execution of the program. Also, report generators can create a new report by describing a mapping of data base elements and the desired form in which they are to appear in the report.

The consolidation and evolutionary strategies are based on the assumption that software will be built as it is today; more dramatic gains — 1,000% productivity improvement and up to 400% quality improvement — require revolutionary changes. Simply stated, the objective is to let users, not programmers, design and build software. Software engineering specifications authored by knowledgeable, experienced applications people can be the basis for automatic

See **STRATEGY** SR/26

Munson is corporate vice-president, technical operations, at System Development Corp., a Santa Monica, Calif.-based information processing subsidiary of Burroughs Corp.

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System manages DOE radiation data

LAS VEGAS — A new computer and a state-of-the-art relational data base machine, along with sophisticated software interfacing and a powerful applications generator, have given a U.S. government contractor here the means to increase its efficiency in administering the Dosimetry Research Project for the U.S. Department of Energy (DOE).

The Dosimetry Research Project was begun to provide a fast and accurate response to requests from various agencies for information related to possible radiation exposure of individuals, according to Robert P. Thompson, systems and programming branch chief for Reynolds Electrical and Engineering Co. (Reeco). Reeco is the contractor that is also responsible for operations and maintenance at the U.S. government Nevada test site 65 miles north of Las Vegas. The dosimetry project gets its name from special half-dollar-size radiation recording devices, called dosimeters, worn by military and nonmilitary personnel where even the slightest possibility of radiation exposure exists. Periodic readings of these dosimeters are taken, the frequency of the readings depending upon the likelihood of exposure.

Because the records of these readings go back as far as the first atomic bomb tests in the Nevada desert, an enormous data base has been created in the dosimetry master file, with presently 1.4 million records of 1,000 characters each. According to Thompson, there has recently been a surge in requests for these records by individuals and organizations in response to claims, litigations and congressional inquiries.

Another problem

The task of meeting this influx of requests devolved upon Reeco and Thompson. But Thompson was faced with another problem — an overloaded Control Data Corp. Model 6400 computer located in a facility here provided by the DOE. Response time on the CDC system was "quite slow," he said. Moreover, Reeco did not have exclusive use of the system. "Other contractors were using the system, our business systems were on it, and the mass storage and CPU were approaching saturation," he said.

Because of the critical nature of the dosimeter data base, one which, Thompson said, "requires high integrity, quality and accuracy," his company began looking for another system that would be installed in Reeco's own building. Two fundamental criteria were considered in the selection: a speedy, unimpeded access to data and a system that would make the shifting of the one-million-plus records of the dosimeter master file from the old system as painless as possible. Reeco chose a Digital Equipment Corp. VAX-11/750, with 4M bytes of memory and 48 ports, as the host computer.

Reeco also opted for a relational data base system. Thompson explained, "Other systems with hierarchical or network organizations were impractical. With the network approach, for example, once you have a data base, you have to relink and change pointers. It's a big problem to change things." He went on to say that many of the dosimeter records were very old, and the file had changed over the years. Thompson needed the capability to get these files into a common format, to move different files into a single master.

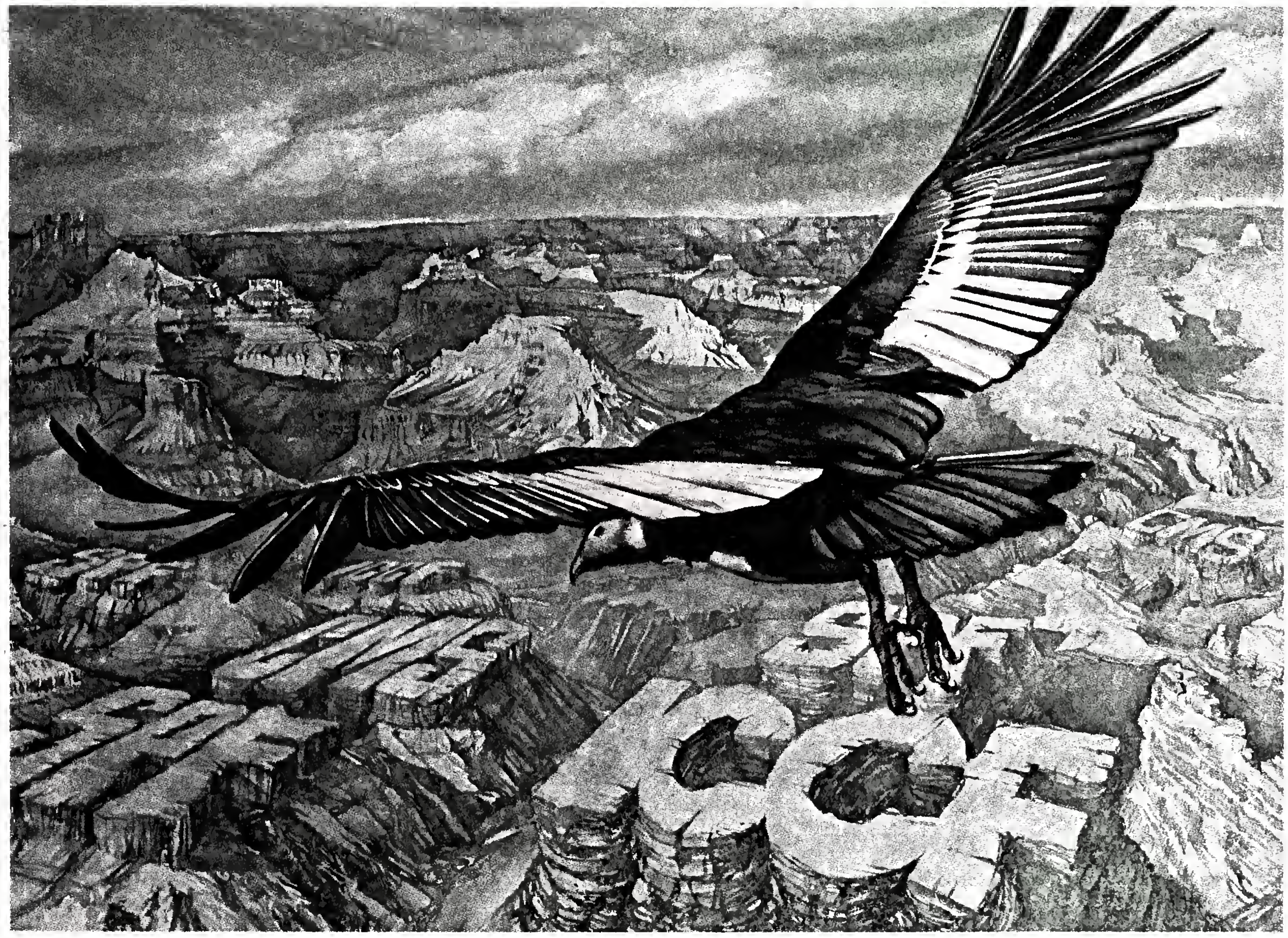
Unfortunately, Thompson said, the trade-off for such flexibility was that the relational software was going to use a tremendous amount of the VAX-11/750's capacity. To solve this problem, Reeco purchased a back-end data base machine called an Intelligent Database Machine (IDM), manufactured by Britton-Lee, Inc. of Los Gatos, Calif. To complement this hardware, Reeco chose a VAX-to-IDM user interface software package, Omnibase, sold by Signal Technology, Inc., of Goleta, Calif.

Thompson and his team began the conversion by creating tapes of 100,000 records, a restriction imposed by their having only one host disk drive. Those records were then broken down into 25,000-record blocks and applied one at a time, with checks made every 5,000 records.

The process involved copying from tape to disk, then performing a file migration from the front-end VAX to the IDM disk drives under Omnibase control.

The new system now supports 25 users, with 15 to be added shortly, and the "difference in the retrieval process is like night and day," Thompson said. Thompson credited a component of the Omnibase product, an application generator called Smartstar that also runs independently on VAX computers, for much of that speed.

Moving the 1.4 million records took two weeks, and not a single record was lost. With 2 million more records to be added to the dosimeter master file from other sources and another 125,000 additional records per year anticipated, the work is not finished.



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STRATEGY

from SR/24

generation of large portions of software. Techniques that permit this are beginning to be invented and tested in computer science research laboratories.

■ Very high-level languages. Algorithmic languages, or higher order languages such as Jovial, have shown that productivity and quality gains over assembly language can be achieved when programmers can express their intent in terms of a problem statement, rather than a machine-like statement. Typically, one higher order language statement generates three to five machine instructions.

The next step is to develop application-specific languages that are at a sufficiently high level so that programmers are effectively removed from the coding process. The languages would be sufficiently comprehensible in order that the user could declare his requirements directly in the language. The Atlas language is an early example of such a language. It is not written for programmers; it is written for electrical engineers who need to test hardware. With such user-oriented languages, field changes would be easily implemented by the operations staff.

> *The consolidation and evolutionary strategies are based on the assumption that software will be built as it is today; more dramatic gains — 1,000% productivity improvement and up to 400% quality improvement — require revolutionary changes. Simply stated, the objective is to let users, not programmers, design and build software.*

■ Application generators. Today, there are commercially available systems that allow an individual to generate programs via either a question-and-answer or fill-in-the-blank interaction with computers. An application generator (written by programmers) then automatically develops software to perform some function based on user answers. Consider today's spreadsheet programs. The user defines the problem as a relationship between elements of the data base and a program construct that computes values for some desirable components. It is the user who directly defines the problem to the computer; no programmer is involved.

■ Reusable software applications. Commercial off-the-shelf software packages, such as operating systems and compilers, have long been reused. Conversely, effective applications software is almost invariably built anew for each system. Reusable applications software would yield dramatic productivity gains; using existing software in lieu of new software saves program development costs, documentation costs and test costs. If the software has already been verified or used extensively in the field, its quality will be vastly greater than that of new software.

■ Knowledge-based expert systems. An expert system is one that has relatively complete knowledge of some subject. It understands the basic concepts relevant to that subject and can perform typically relevant analyses and syntheses. Expert systems can reason about the subject area, determine what to do next to reach some goal and explain to its user the sequence of reasoning used. Expert systems have been created in the areas of mass spectroscopy interpretation (Dendral), medical diagnoses (Msyin), geological exploration (Prospector), and computer hardware configuration determination (R-1), which is the first expert system that has been used by choice in a commercial situation.

Expert systems must be programmed in the conventional way to contain rules for reasoning about the subject area. However, once written, the expert system can be used by a person who is not an expert in software, but an expert in the particular subject area. It can then be used in many situations where, today, new programs would have to be written.

An expert system could be developed to construct a particular kind of software. In that case, it could write new software of the sort that it understands, with directions from its user.

All three strategies contribute to the increased productivity needed to combat the growing problem. All three strategies are needed and should be implemented immediately. The revolutionary strategy will achieve the highest payoff, but will not begin producing results for another five years. In the interim, we need the productivity improvements possible with the consolidation and evolutionary strategies to keep pace with the near-term requirements that will otherwise prove unmanageable.

Both the consolidation and evolutionary strategies are based on techniques that the private sector can implement itself. This implementation requires some investment, of course, but it is an investment that can generate a return far greater than any other investment.

The revolutionary strategy requires investments that are of a much higher magnitude and that will require a much longer period to pay dividends. As a result, they are beyond the reach of all but the very largest firms and the government.

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Micros help shift productivity emphasis

By Robert Goldman
Special to CW‡

Although discussions of productivity often concentrate on issues of programmer productivity and more effective programming tools, the bottom line for corporate management productivity is whether accurate information is available in time to take corrective action.

In other words, information systems programmer productivity can be measured in terms of its ability to support an increase in management productivity.

This is not to say that fourth-generation languages, programming aids and code generators are not important.

They can be crucial to program generation and development. However, these tools are only meaningful in a context in which the information system has the ability to deliver data from the data base, application programs or outside data sources to the manager's desktop.

Confusing help

The means for delivery of management information is available in the form of the personal computer. However, the vast proliferation of personal computers has probably been more confusing than helpful to most corporate DP departments.

Personal computers and personal computer software have the potential to increase significantly the productivity of corporate managers. One of the two major uses of personal computers is as a management workstation (the other being as an end-user processor).

Yet the mere presence of the personal computer on a manager's desk does not ensure that the manager's productivity will increase.

If the personal computer cannot be intelligently linked to the mainframe so that all of the relevant data on the mainframe is available to the personal computer user for analysis and action, then the personal computer is not a useful tool to the manager.

Analysis standpoint

What does a manager want to know from an analysis standpoint? To make decisions, set policy and oversee changes, most managers are not interested in details, but in summarized data or information.

Data involves a lot of detail over a short amount of time, whereas information represents a smaller amount of detail available for a longer period of time.

Converting data stored on a mainframe computer to information is necessary to make that data useful to today's managers — personal computer users.

If managers using their personal computers are required to do that conversion themselves, using a query language or report writer whenever they want access to the company data base, they will have to know a lot about the mainframe, query languages and many other aspects of DP software. Productivity goes down, as does the efficiency of the microcomputer.

Ideally, managers want data from the mainframe to appear as information on the personal computer so that they do not have to learn about mainframe operations to use their microcomputers. The easiest way to accomplish this is to make the mainframe appear as if it were another disk available on the personal computer.

If all the data resident in the mainframe appeared as an additional disk to the microcomputer user, then the mainframe would become an extension of the personal computer. There are no languages to learn, and files are downloaded through predefined, automatic procedures. Managers would simply be using files from the mainframe in the same way they would use their personal computer files.

Productivity is also increased when information can be prepared or altered on a personal computer, then uploaded, or included with the mainframe data.

This compares to saving a file, the same way a user would save it on a hard or floppy disk.

Once this capability has been established, managers using their personal computers have unlimited disk storage capacity. They can use the storage available on the mainframe and are no longer limited to floppy and/or hard disks.

An intelligent link between the mainframe and micros also enables all the personal computers connected to that mainframe to communicate with one another.

A complete software solution embodies the true information center — the key to future productivity for managers and those interested in maximizing the utility of microcomputers in a business environment.

Goldman is president and chief operating officer of Cullinet Software, Inc., a Westwood, Mass.-based developer of programs for IBM mainframes and personal computers.

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Software tool drives Jaguar's MIS effort

LEONIA, N.J. — Jaguar automobiles have long enjoyed a worldwide reputation for high performance, sleek efficiency and a sticker price to match.

In the U.S., in the midst of the recession, sales of the six- and 12-cylinder cars increased from 3,000 units in 1980 to almost 16,000 in 1983. The MIS department of the U.S. division of Jaguar watched this growth with obvious satisfaction, even as the department's backlog of applications grew to three or more years.

MIS manager Bill Morris knew he had to match increases in productivity achieved on the assembly line in the UK with productivity boosts in his 13-member MIS department here. Through automation, Jaguar had increased productivity from 1.59 cars per employee in 1980 to 3.6 cars per employee in 1983. Taking his cue from the manufacturing area, Morris, in late 1982, began to look for ways to automate the MIS function and thereby squeeze more performance out of the available resources.

"Because of the tools we had to work with, systems development was a problem," Morris recalled. All on-line work was done in assembler under CICS, he explained, and, adding insult to injury, only the department managers did the actual coding. The programmers were not doing on-line development at all because of the complexities of macro-level programming.

Morris decided that it made no sense to train existing staff on the existing CICS methods. First, the learning curve for CICS was considerably long. Second, the approach would violate the principle that true productivity is a result of people working not harder, but smarter.

Moreover, the entire system is vulnerable when the programmer is doing virtually everything: One bug can bring the entire system down. As a practical matter, CICS programmers are in great demand throughout the industry. Hence these programmers expect — and receive — premium salaries.

The alternative that Jaguar considered was to automate the systems development process by leveraging the use of Cobol. "We decided to take the people we had and increase their productivity in what they knew well," Morris said.

Finding a development tool

Expertise in Cobol was well-represented across his entire staff. The challenge was to locate an application development tool that would support the Cobol programming effort in a CICS/VS environment.

In November, 1983, UFO/Cobol from Oxford Software, Inc. was installed on Jaguar's IBM 4341 under CICS Release 1.4.1. "With UFO/Cobol, you're really divorced from the intricacies — and dangers — of CICS," Morris said.

Another advantage the staff perceived was in the area of screen painting. The UFO/Cobol facility remembered all alterations, field names and attributes. Because modifications could be made more easily, the facility made it possible for users to participate in the system design process. Morris said that the results were better systems and more satisfied users.

But the telling point for Morris was that UFO/Cobol is completely a tool for Cobol programmers. "It is as close to batch Cobol programming as you can get," Morris said. The basis of the tool is a series of standard Ansi Cobol statements with natural extensions to handle the complexities and requirements of an on-line environment.

Improved quality

In the first month after Jaguar began production work with the new tool, the number of on-line applications increased dramatically. Quality was also improved because it was practical for Jaguar departments to see reports and screens prior to final delivery of a system. In UFO/Cobol's Demo mode, analysts could simulate the final system by defining a group of panels in a sequence. By assigning a programmed function key to each panel, Demo mode allowed Jaguar users to walk through an application before writing any code.

"UFO/Cobol will help us take a bite out of the current backlog," Morris explained, "and it's going to open up a hidden backlog, as well. Because of our ability to be much more responsive, many more users will submit requests. We're going to be able to do more, but we're also going to have more demanded of us.

"The answer," he suggested, "is to consider that traditional MIS approaches may not always be the best solution.

"The challenge is for everyone to recognize that the MIS department functions as a service company for the rest of the organization. It must develop the tools and procedures to increase efficiency and productivity if it is to remain competitive and viable."

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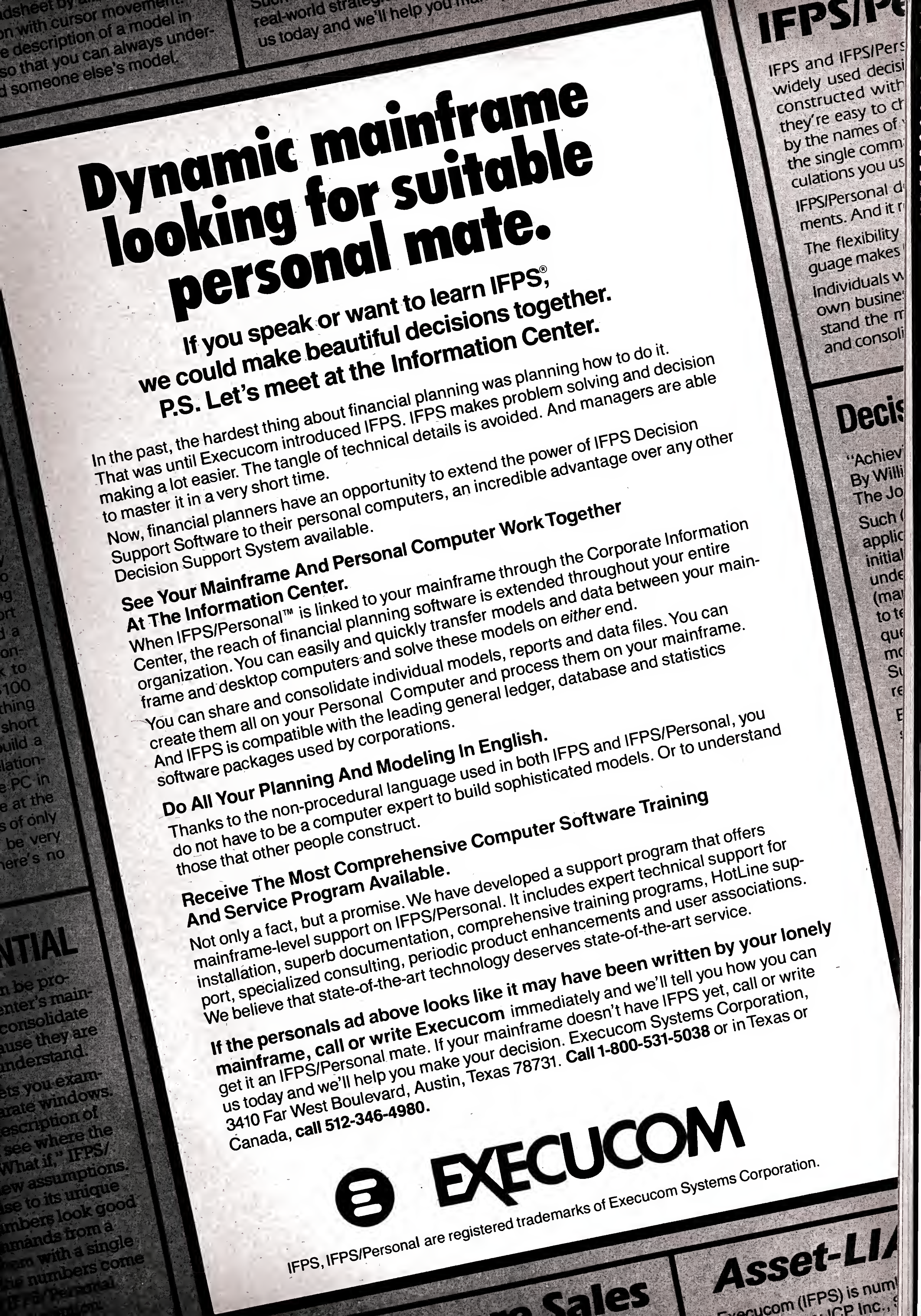

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General problem-solving methods will ease

By Laura L. Scharer
Special to CW‡

In the ever-changing world of business applications, prototyping is an exciting concept for software development. It offers increased development productivity and enhanced system quality all rolled into one. But if yours is a shop that is just now settling into the rigors of the precise system development and project management structures that became popular in the 1970s, then prototyping might be forcing you to re-evaluate your methods just at a time when you are ready for a breather.

> *Keep the concept of prototyping simple by thinking of it as . . . anything that significantly reduces the wait time between when a user describes a specification and when he sees that specification.*

Scharer is manager of information systems planning and management services at O. M. Scott and Sons, Inc., a Marysville, Ohio, lawn and garden products firm.

Don't worry. Prototyping does not happen overnight. If you are a going concern, you have to deal with the old as you take on the new, and that takes some time. You most likely have a huge investment in software and, of equal importance, in software development practices that must be considered, protected and managed for optimal payback even as you bring in new methods. This investment, and the value of your current portfolio, must be balanced against the rationales and promise of prototyping. With this in mind, how do you keep the best of the old while incorporating the best of the new? How do you get there from here?

First, you must dispense with semantics. Don't argue about what prototyping is, because it is really many things. The best definition for prototyping came from James R. Johnson. He captured the many faces of prototyping by distinguishing four levels of prototyping activity:

- Level 1 — Mock-ups of printed reports or screens.
- Level 2 — Simulated interaction of on-line activity or batch reports.
- Level 3 — A partial working model of a system that can be gradually expanded, completed and implemented.
- Level 4 — A research project that uses a working model to prove the feasibility and approach of a system design. The result may or may not be pursued.

Keep the concept of prototyping simple by thinking of it as just about anything that significantly reduces the wait time between when a user describes a specification and when he sees that specification — preferably in action. It is from these two elements — time compression and the availability of a model — that the benefits of prototyping originate:

- The more quickly you develop a system, the less time there is for the business environment to change around the project, so fewer specification changes are forthcoming.
- There can be immediate detection of communication errors.
- The user gets quick reinforcement of his ideas, so he is drawn into the project.
- Prototyped designs are, to a large extent, self-documenting.
- System development red tape is minimized.
- There is the possibility of eventual implementation of the design model into production.

Crossing the semantic bridge is the first step toward prototyping from wherever you are now. Focus on reducing the wait time between system specification and system demonstration. With that focus, there is much that can be done today within your current environment.

The next step toward prototyping is to concentrate on solving a problem rather than trying to execute a methodology. System development, especially the design portion of system development, is a specialized application of the general principles of problem solving, which any elementary psychology book will tell you involves only a few steps:

- Step 1 — Preparation. Determine what is the problem, find out what information is available, and identify constraints imposed on the solution.
- Step 2 — Production. Create alternative solutions.
- Step 3 — Judgment. Evaluate alternatives and select the best answer.

Traditional methodologies are nothing more than the essential elements of problem solving, with a lot of fluff added for exaggerated precision, pedantic and superfluous communications and effect. All of this ef-

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your move to prototyping, if you use them

fect takes time, and taking time is precisely what we're trying to avoid with prototyping.

So the second step on the road to prototyping is to remember: Don't do anything unless it contributes directly to solving the problem at hand. Hang on to the best of your old methods — your carefully learned analytical thought process, your techniques for arranging and diagraming the flow of information in a system, your different frameworks for generating and testing alternate theories. But at the same time, pare down your methods. Dispense with the written word and with formality for formality's sake whenever you can do so without jeopardizing your real objective: solving a problem.

The third step toward prototyping is to recognize that you do not have to build the whole system all at once. Similarly, you do not have to design the whole system before you can begin to build one part of it. Instead, prototyping encourages a building-block approach to system development that looks like this:

- ■ Devote some study and analysis time to get a high-level overall picture of the problem at hand.
- ■ Decide what system pieces are needed and, in the broadest sense, how they must fit together. The glue is an overall data base concept.
- ■ Pick out the hub or foundation of the system (often a critical data base with its updates and inquiries).
- ■ Offer to design and implement that portion of the system first, promising early delivery and a quick return from that most essential part.
- ■ Then build one piece at a time onto that foundation.

The third step toward prototyping is to time-slice your projects. Build a foundation first and hammer out quickly any problems it might have. After the foundation is right, start adding to it one step at a time. This project engineering concept can begin to offer the benefits of time compression, even within your current environment of methodologies and tools.

The fourth step toward prototyping is to recognize it as a new and developing approach to system development and simply try it. Don't require proof of the concept before you are willing to get your feet wet. Don't wait for a how-to-do-it cookbook to come along before you begin. Become comfortable with the basic elements of the concept (simply, time compression and modeling) and then see how you can make these concepts work for you.

You cannot prototype and play by the old rules at the same time. If your managers, your users and your auditors are enamoured of old methodologies, big projects and volumes of design documentation, you will be hard pressed to convince them — on paper — that prototyping has anything to offer. So just do it.

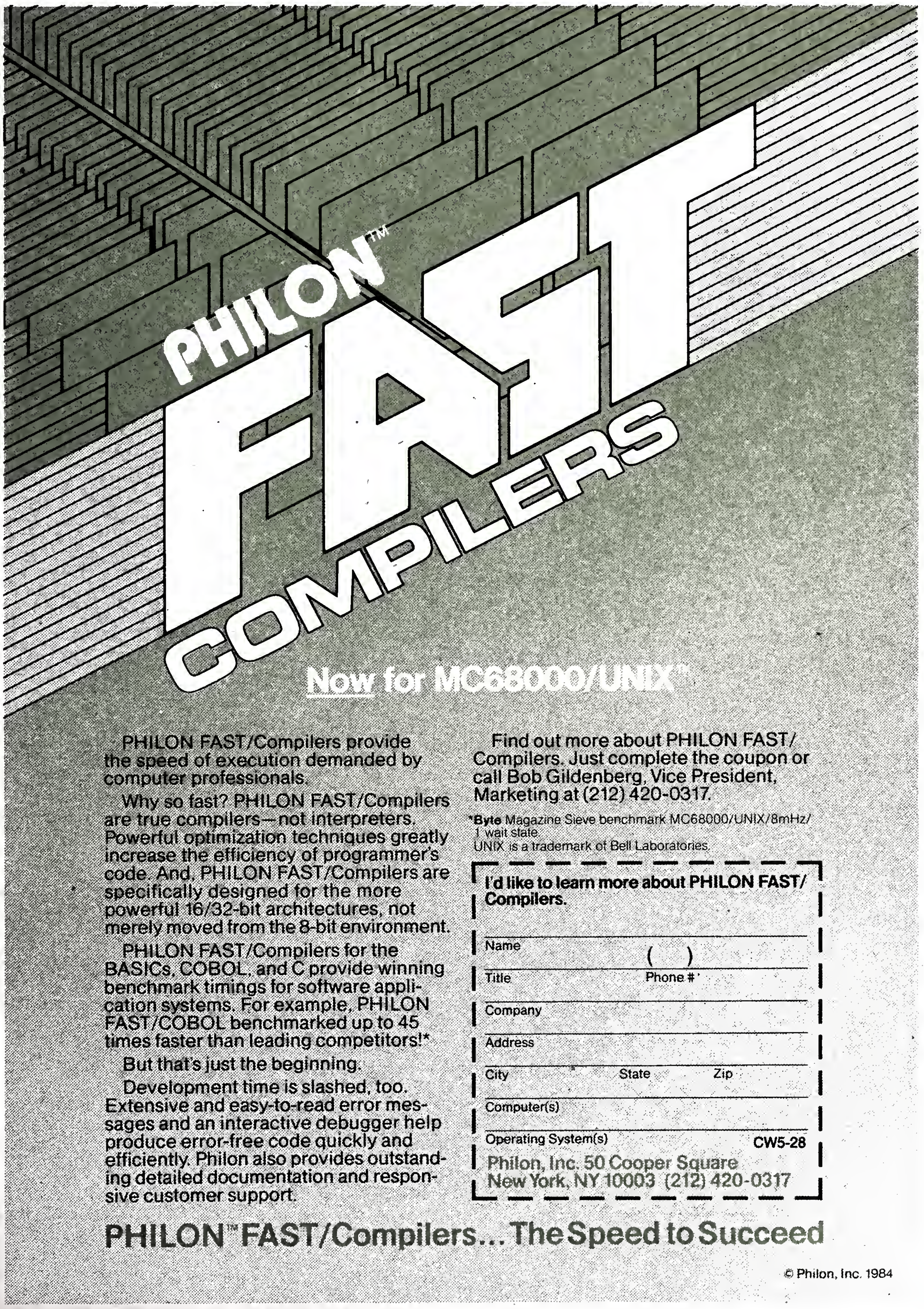
Set up a pilot project, position the project as an experiment so you are allowed to break the rules, and then let the concept speak for itself in terms of its results.

Right tool will make a difference

You can achieve some of the benefits of prototyping within whatever tool environment you currently have available. But what a difference a tool makes. With highly interactive code-generating tools available to your analysts and programmers, the objectives of time compression and system modeling can be accomplished optimally. So the next step toward prototyping is to bring some tools in-house.

The tools strategy for prototyping does not have to be elaborate or particularly costly. Two excellent prototyping tools are electronic spreadsheets and screen painters, and by now many shops have access to at least this level of sophistication. Two other types of prototyping tools that are sometimes overlooked are reusable code libraries (ready-made building blocks) and purchased software applications (some, for personal computers, priced very reasonably). All of these allow rapid creation of system models for demonstration to the users. Of course, more sophistication is available in the form of program generators and very high-level languages built around relational data bases. But your investment in tools to support prototyping can be allowed to grow right alongside your sophistication with the method.

You don't become a prototyping shop the moment a fourth-generation language walks in your door. Other changes have to happen. But bringing some tools into your environment is certainly another step on the path to prototyping.



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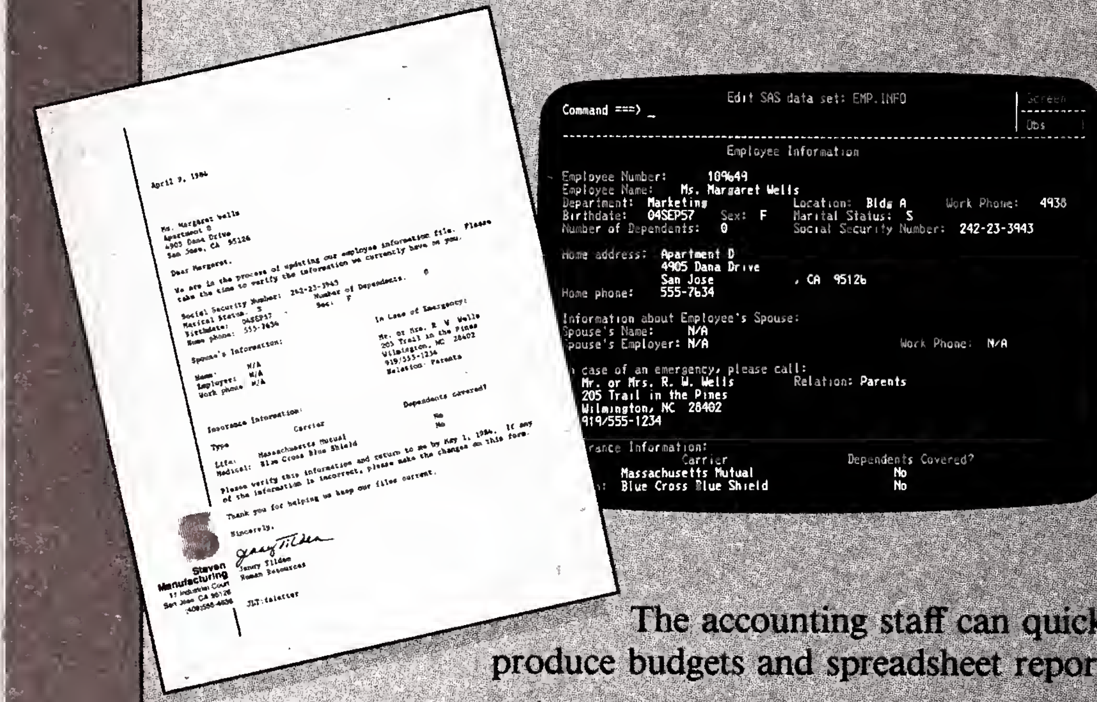

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Command ===> _                                                 |-------
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Employee Number:     109649
Employee Name:    Ms. Margaret Wells
Department:  Marketing          Location:  Bldg A     Work Phone:   4938
Birthdate:   04SEP57    Sex:  F  Marital Status:  S
Number of Dependents:   0        Social Security Number:  242-23-3943

Home address:  Apartment D
               4905 Dana Drive
               San Jose              , CA  95126
Home phone:    555-7634

Information about Employee's Spouse:
Spouse's Name:      N/A
Spouse's Employer: N/A                             Work Phone:   N/A

 case of an emergency, please call:
  Mr. or Mrs. R. W. Wells          Relation: Parents
  205 Trail in the Pines
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               Carrier                        Dependents Covered?
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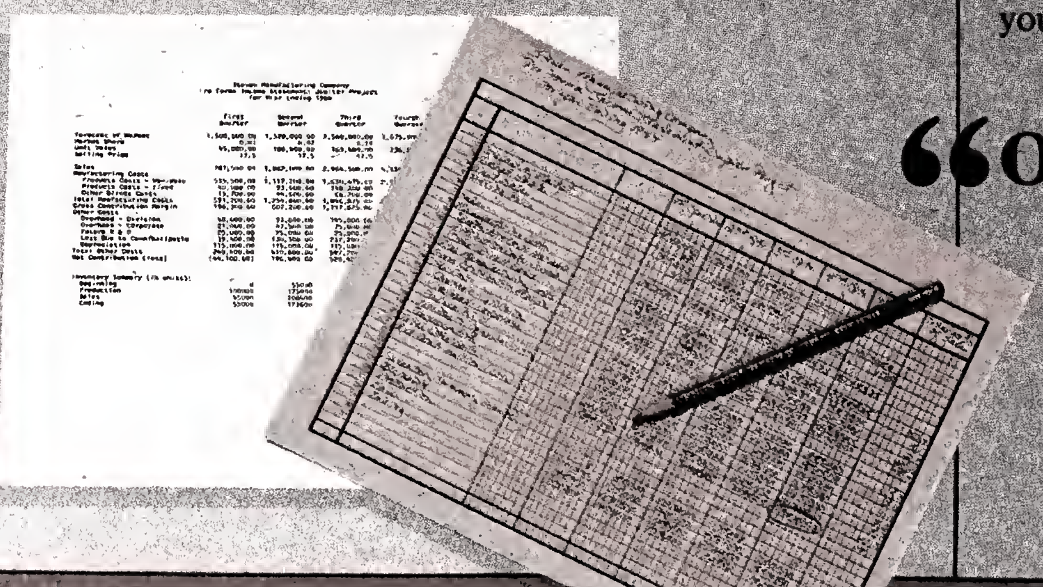

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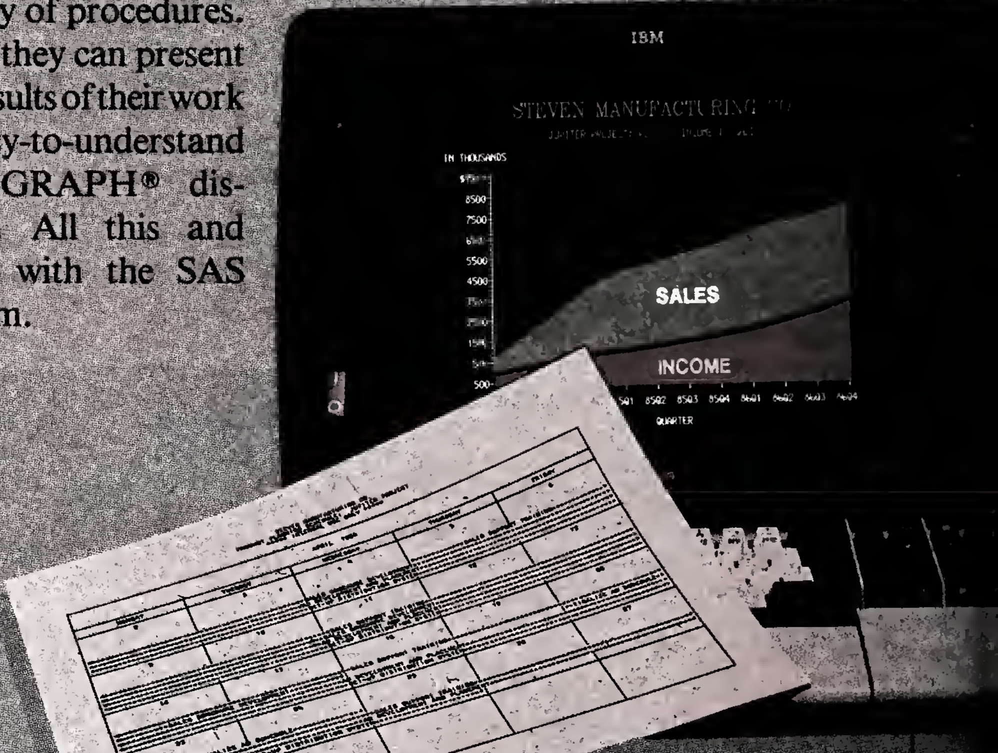

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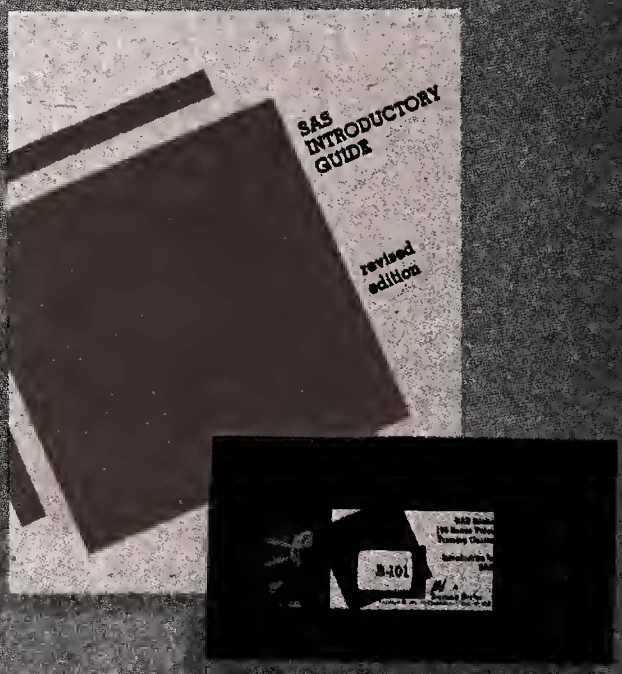

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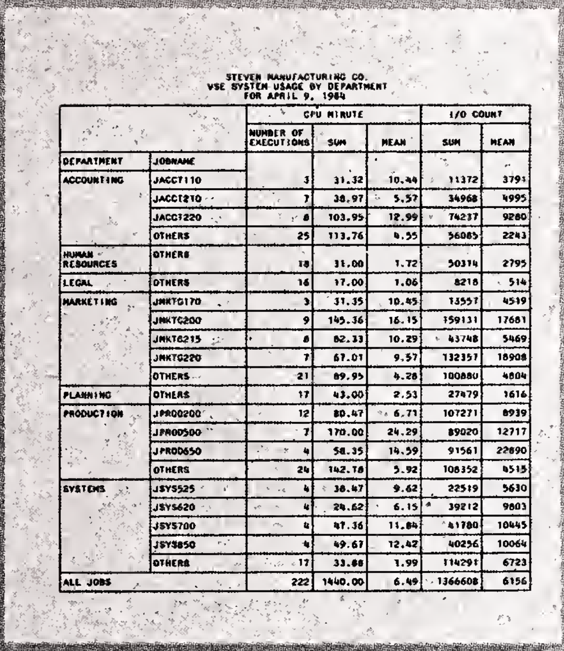

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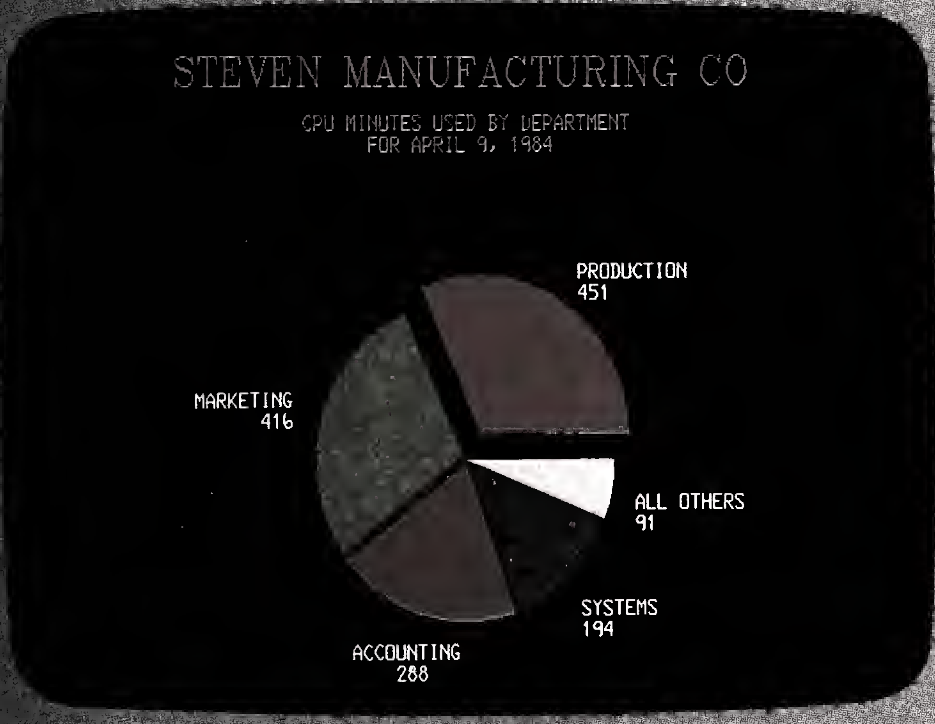
FOR APRIL 9, 1984

		CPU MINUTE			I/O COUNT	
		NUMBER OF EXECUTIONS	SUM	MEAN	SUM	MEAN
DEPARTMENT	JOBNAME					
ACCOUNTING	JACCT110	3	31.32	10.44	11372	3791
	JACCT210	7	38.97	5.57	34968	4995
	JACCT220	8	103.95	12.99	74237	9280
	OTHERS	25	113.76	4.55	56085	2243
HUMAN RESOURCES	OTHERS	18	31.00	1.72	50314	2795
LEGAL	OTHERS	16	17.00	1.06	8218	514
MARKETING	JMKTG170	3	31.35	10.45	13557	4519
	JMKTG200	9	145.36	16.15	159131	17681
	JMKTG215	8	82.33	10.29	43748	5469
	JMKTG220	7	67.01	9.57	132357	18908
	OTHERS	21	89.95	4.28	100880	4804
PLANNING	OTHERS	17	43.00	2.53	27479	1616
PRODUCTION	JPROD200	12	80.47	6.71	107271	8939
	JPROD500	7	170.00	24.29	89020	12717
	JPROD650	4	58.35	14.59	91561	22890
	OTHERS	24	142.78	5.92	108352	4515
SYSTEMS	JSYS525	4	38.47	9.62	22519	5630
	JSYS620	4	24.62	6.15	39212	9803
	JSYS700	4	47.36	11.84	41780	10445
	JSYS850	4	49.67	12.42	40256	10064
	OTHERS	17	33.88	1.99	114291	6723
ALL JOBS		222	1440.00	6.49	1366608	6156



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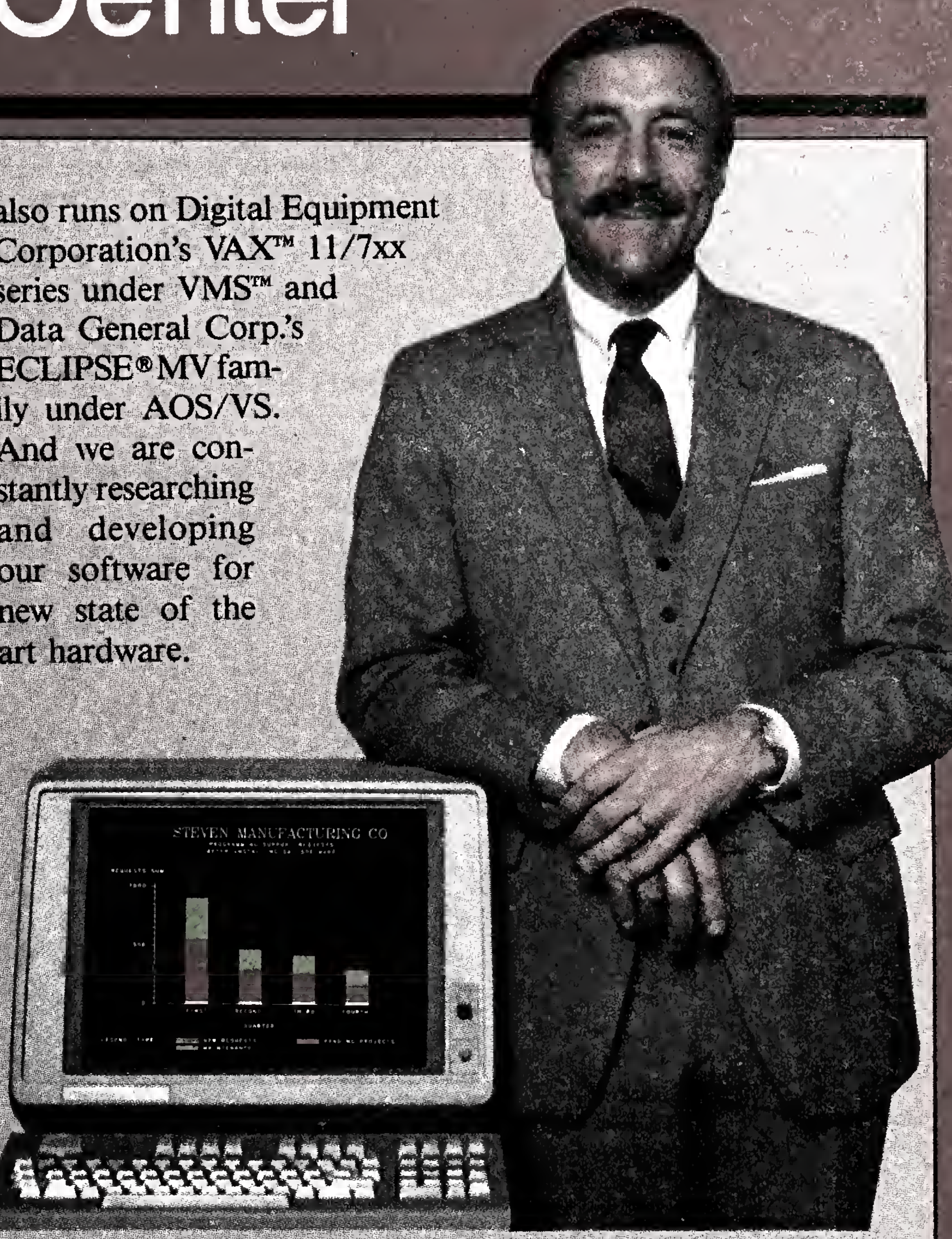

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5/28

Team approach mixes design, development,

Special to CW‡

A lot has been written about the three D's of programming — Design, Development and Documentation. There is a method whereby all three are integrated into a single, simple process that can be easily implemented.

The approach is team design using the Warnier methodology. Team design will help achieve high-quality programs that are structured, functionally correct and fully documented. In fact, the program will be documented before a line of code code is written, at little or no extra cost.

Working in teams is a long-established practice that reduces the isolation of the individual worker. It takes advantage of the combined skills and knowledge of a group to complete a task. At the same time, it expands the individual's abilities through exposure to the ideas of others.

Team design is the development of a program design by a group instead of an individual. It is the investment of their collective knowledge at the beginning of a program to achieve a correct design the first time, rather than investing resources to remedy problems later.

The product of team design is a detailed program design showing all modules, control logic, process steps within each module and the documentation. It does not include the actual code. Cod-

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This article was prepared by Karl Smith, Stan Wall and Hudson Henry. Smith and Henry are vice-presidents and Wall is president of New Generation Software, Inc., a consulting firm based in Salem, Ore.

Suggestions for starting your team

For those interested in exploring team design development, the following suggestions are offered:

■ Start simple. Start with what should be an easy and straightforward program. As you gain experience, progress to the more complex programs.

■ Be patient. Initially, team design may take longer than individual design. As with any discipline, it will take time, hard work and a dedicated effort to pull it all together.

■ Examine and analyze the progress. Establish a file of completed program listings. Use this to improve and enhance the program standards for your shop.

■ Document the process. Keep track of the amount of time spent using this technique vs. your current method. If your group has not realized a significant benefit after a reasonable amount of time, you should return to your original method.

■ Insist on management commitment. As with any change, team design will require it.

■ Provide training. This process is based upon the Warnier diagram methodology. To fully exploit the power of the Warnier diagram, appropriate training should be obtained.

Team design is easy to learn and can be explored without a major financial or personnel investment. Team design will reward you with increased productivity, higher quality programs, shared knowledge and personnel growth — all major benefits.

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documentation in cooperative programming

ing and compiling are still accomplished by the individual programmer.

The design team is usually composed of at least three people, but never more than five. Ideally, a team should be made up of an analyst and two programmers. The person who will do the actual coding is always a part of the design team to ensure that he thoroughly understands the design and desired results. A fourth member may be included for training purposes.

Including the analyst in the entire design process significantly improves the flow of information, thereby reducing the overall development time. Another benefit is that immediate feedback is provided to the analyst as to how well he has communicated via a specification.

A team-designed program starts in the traditional way. An analyst develops a program specification in a narrative form, and specifications are given to each person selected to participate in the task.

After the individual members have examined the specifications, a formal review is held. If significant deficiencies are found, the analyst will rework the specifications, and a subsequent review will be held. The team meets shortly after the review to develop the actual program design.

The design process begins with the development of a logical, high-level description of the program. Once this is completed, a detailed Warnier diagram that represents the physical design is developed. All necessary procedural steps are defined in this process. The level of detail may vary, but should include anything needed to document clearly what is to be accomplished.

The design details are prepared in structured English.

See **TEAM** SR/40

Maintain a strict set of rules

It is important that a design session be governed by a clear set of rules:

- All members must be committed to the design effort. It is a team responsibility, not an individual responsibility.
- Everyone must participate. All members are equal. There is no rank or position on the team. Each must leave ego out of the team effort.
- All ideas should be considered. The team's goal is to get the best design possible for each program.
- Designs are developed by the team. The design starts from the beginning. One person does not prepare a tentative design only to have it reviewed by others.
- Key members should be identified at the beginning of the effort. If a key member of the team must leave, and he is deemed critical to the design, the design process should stop until that person can return.
- If for some reason, a team member — other than a key member — leaves a design session, he must not come back later and try to catch up.
- Design sessions should be held in a location away from the usual interruptions of the office. No telephone calls. No outside distractions. The environment must not be distracting to either team members or outsiders.
- A marking board of some type is a must. Design work requires a medium that can be seen easily by all and can be readily erased or redrawn.

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Application generators focus on data base

By Steven Pfrenzinger
Special to CW‡

> *Designing systems for application generators is different from designing traditionally developed systems. Application generators are inherently data-base-oriented, not process-oriented, and are built to interface with a data base management system.*

Your MIS manager made a good decision. He listened to all the well-known authors and lecturers advocating 10:1 productivity gains through the use of the new application generator.

He completed a product evaluation, made a selection and had you trained to use the new application generators. Now you're ready to address that application backlog, right? Not yet. You've been trained to program with this new high-level language, but do you really know how to design systems for application generators?

Designing systems for application generators is different from designing traditionally developed systems. Application generators are inherently data-base-oriented, not process-oriented, and are built to interface with a data base management system. This means that the new system will be built around the data base and not vice versa. This requires that the data base design issue be addressed sooner in the development life cycle.

The need for a stable, normalized data model, prepared during the early stages of the design effort, is now a minimum requirement. This, plus numerous other application generator considerations, needs to be addressed.

Approaching the design of the system with the application generator and its data base orientation in mind involves a recommended sequence of events:

- Define the functional requirements.
- Build a data model.
- Understand the application generator.
- Create the specifications.
- Conduct design walkthroughs.
- Consider prototyping.
- Design the physical data base.

This is the traditional functional decomposition of the user's requirements, one where the system is broken down in a top-down fashion until the lowest subfunctions can be identified with some transaction (unit-of-work) process that can then be related to some number of programs and screens (henceforth referred to as transactions).

■ **Building a data model.** Numerous books and vendor products address this effort. Very simply stated, this is the grouping of related fields into segments and the segments into logical views that depict the segment relationships within subject data bases.

■ **Understanding the application generator.** Every application generator has a number of options, considerations and restrictions that must be understood if it is to yield the productivity gains stated by the vendor.

■ **The specifications.** If the application generator is data-base-oriented, it seems natural that the programming specifications should use a data-base-oriented technique, one that insists that the preparer identify all the required segments and keys in the data model required for a particular transaction process.

This access map, as it is sometimes called, shows the interaction with the data model and will be the basis for the action diagram (specification). The action diagram is simply the access map expanded to include the transaction logic (field editing, processing, document generation and so on). Accompanied by appropriate attachments (screen layouts), the next step is a walkthrough.

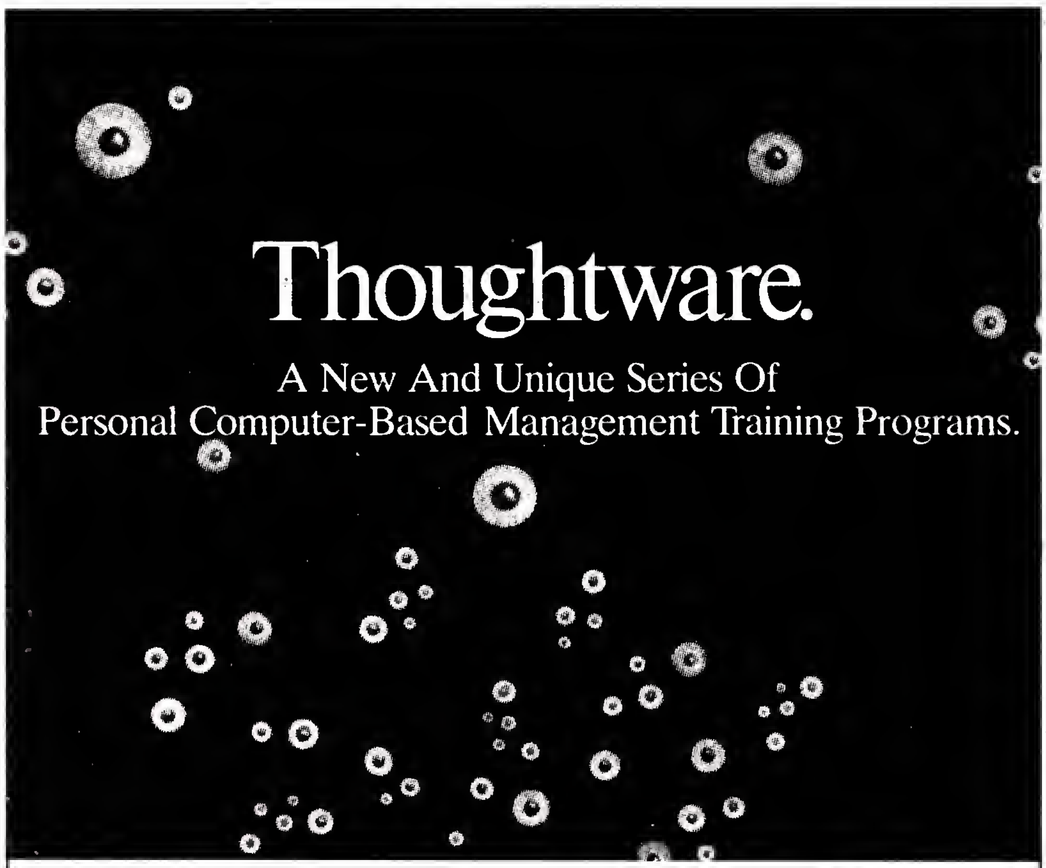
■ **Design walkthrough.** The design walkthrough usually involves the preparer, a knowledgeable user and an experienced application generator developer. Together they will determine, through an iterative process, whether the transaction will meet the user's needs and whether it can be programmed with the application generator. Do not make the fatal mistake of thinking walkthroughs unnecessary.

■ **Prototyping.** Because application generators are great for creating skeletal versions of the transaction process, a prototyping step may be useful or required to confirm user satisfaction.

■ **The physical data base.** Define the physical characteristics of the data base, load it with some test data and get started.

Follow these steps when appropriate, and you can nearly guarantee success; not following these steps can almost always guarantee dissatisfied users, unnecessary delays, substantial technical problems and a group of developers and designers ready to blame the application generator for their failures.

Pfrenzinger is a software consultant based in Encino, Calif.



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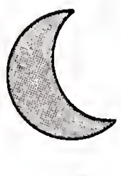

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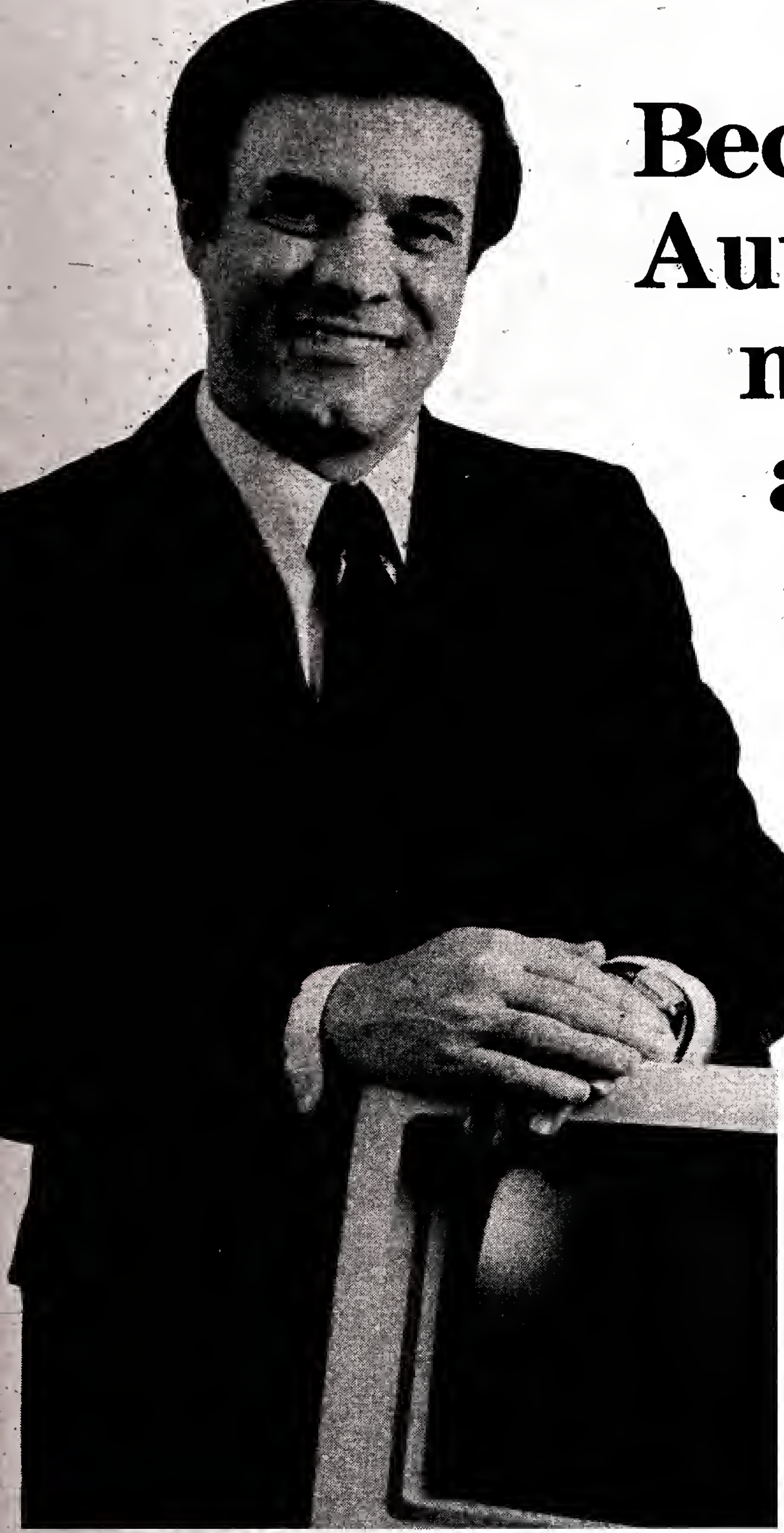

*Frank L. Chisholm is Cullinet's Executive Vice President. Frank has worked closely with Cullinet users and prospective users for more than six years. As a key member of Cullinet's management team, Frank has contributed heavily to Cullinet's database product development strategy.

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System launches time savings for Nasa

HOUSTON — A fourth-generation language and integrated data base management system package is providing productivity gains at the National Aeronautics and Space Administration's (Nasa) Johnson Space Center here.

Rexcom, a software product from Rexcom Systems Corp., based here, has been running on several of Nasa's Harris Corp. and Gould, Inc. SEL Division superminicomputers since early 1980. Located in Nasa's training division, Rexcom is being used by the flight personnel training group for a number of tracking and reporting applications.

Significant productivity gains have been realized since the installation of the system over four years ago. According to Raul Mejia, the project manager, "During these four years, the software package has paid for itself many times in the amount of time it has saved us in developing and maintaining several application systems, when compared with equivalent systems that may have been written in Cobol or Fortran.

"We estimated that during the calendar year of 1980 alone, we saved 129 man-weeks of development. That is, we developed in 63 man-weeks, using Rexcom and associated report writer and access routines, what would have taken 192 man-weeks using a more traditional set of software tools."

More recently, a project was completed during the first of 1984 to forecast training facilities usage given a particular flight project load. Flight schedules for future missions are also generated with the application. Results are plotted on a Versatech V-80 as well as on-line or printed.

Mejia said, "That application took a programmer and myself three weeks to complete with Rexcom. Our analysis had estimated eight man-months in Fortran." Translated into dollars, it was a savings of over $75,000, he said.

Nasa's applications under Rexcom include a training records system used to keep track of all the training given to astronauts and flight operations personnel. Another application keeps track of the personnel assigned and time used in various projects within the Flight Operations Directorate. Both operate on the Harris 800 computer.

An application on the Gould/SEL 32/38 system is a change request system used to keep track of all discrepancies and new requirements submitted to one of the computer installations for flight simulation.

A user as well as manager of the Rexcom system, Mejia said about various productivity features: "The language uses very concise directives. In a few statements you can do what would take many times that many lines of Cobol or Fortran code.

"Another very big time-saving feature is the interactive definition of the data base through the screen painting process. It cuts down on the time and headache involved in using a data base definition language that must be linked or integrated to other subsystems like the data dictionary and the screen forms. Rexcom does all that automatically.

"Equally as important as the reduction in coding time is the ability to prototype with the system. A screen and several processes can be quickly written and then shown to end users to get immediate feedback on system design and function. Also, processes can be tested on-line immediately and in whole or in part since the code does not need to be compiled or linked before it will run. That saves time in a development mode."

An unexpected area of productivity improvement for Nasa came in the area of maintenance and end-user computing. According to Mejia, "Great savings are realized daily in the area of maintenance because the user can do many of the functions that would normally require a skilled software person. The software specialist benefits too, though, because the Rexcom language is a lot easier to maintain than traditional languages.

"Examples of end-user maintenance include writing new reports or modifying old ones, creating or modifying terminal screen formats, writing programs to provide new information and so forth. The report writer, for instance, is very easy for nonprogrammers to use. . . . end users with little training can write [most] standard reports themselves."

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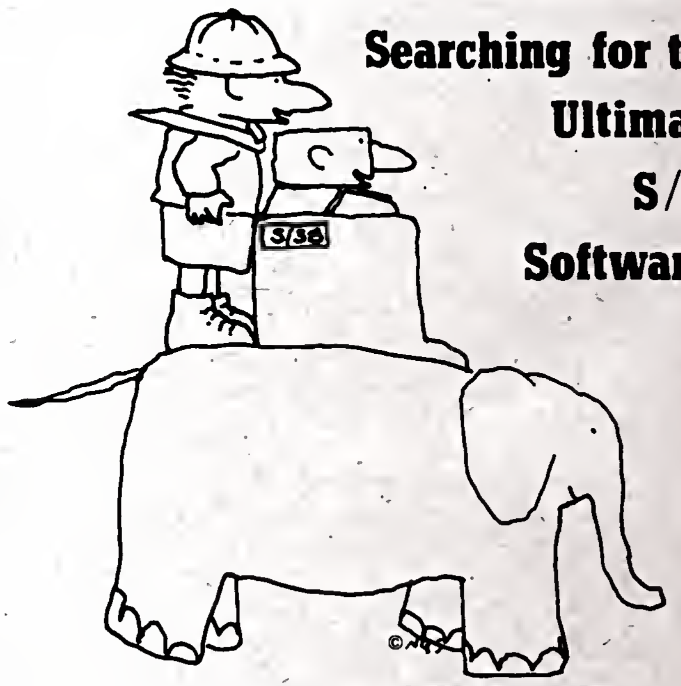

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Don't blame structured programming

Traditional academic approaches neglect practical considerations

By Jeff Thompson
Special to CW‡

One of the more widely taught design and coding techniques is that of structured programming. It has been hailed by academics as one of the few truly logical approaches to program design and an approach that must be religiously adhered to as a demonstration of professionalism. Unfortunately, structured programming as taught has served to decrease program readability and subsequently has increased maintenance cost.

Structured programming was developed in the late 1950s as a method to simplify program structure. Simplified structure, it was believed, would aid in proving program correctness, which would decrease debugging time and effort. The desire to prove program correctness has since faded. The continued use of structured programming is due to its supposed enhancement of program readability and programmer productivity. Productivity is influenced in the initial design, coding and testing stages, but the maintenance aspects are not considered in teaching structured programming. Maintenance, however, is typically the largest cost over the lifetime of software.

Thompson is a programmer/analyst and project leader at Ball State University in Muncie, Ind.

> ***These constructs and limitations have resulted in decreasing readability and increasing long-term maintenance cost and program inefficiency.***

If structured programming were to be applied in terms of enhancing maintenance, substantial long-term cost savings could be realized.

Structured programming achieves its benefits through limiting control structures. The only control structures allowed are simple sequence, selection and iteration. Simple sequence is the process whereby statements are executed in consecutive order. Selection concerns itself with the action taken resulting from the evaluation of a condition. Iteration is the process of controlled looping. A final though not inherent aspect of structured programming, is that of single-entry/single-exit modules. In other words, there should be only one point at which a module may be entered or exited; branching out of a module is prohibited.

As originally defined, structured programming can be beneficial in enhancing productivity, program readability and program predictability. The impracticality of structured programming stems from the interpretation being used in the classroom. Universities and technical schools have propagated such bastardizations of the original intent as one-time performs, complete elimination of the GOTO statement and unnecessary nesting of IF statements and performed modules. These constructs and limitations have resulted in decreasing readability and increasing long-term maintenance cost and program inefficiency.

Structured programming constructs concerning simple sequence (modularity), selection, iteration and single-entry/single-exit modules can enhance readability and subsequent productivity. The disadvantages of structured programming are not inherent in the technique, merely in the methodology being taught in the classroom.

The following guidelines should be utilized to integrate classroom training with practical reality:

- Modules of code that are performed only once should not be used. Instead, the code should be directly inserted into the program flow.
- GOTO statements are allowed under the following constraints:

  All GOTO statements must be forward-branching.

  All GOTO statements should terminate at a module exit.

  No GOTO statements should ever transfer control outside the module in which they are executed.
- Deeply nested IF statements should be replaced by several simplified IF statements using forward GOTOs to branch to the module exit.

Practicality and maintenance concerns should remain the primary determinants in the use of structured programming or in any design or coding technique. By observing practical, instead of academic, constraints, more easily maintainable programs can be written while still achieving the benefits inherent in structured programming.

Example A.

```
PROCEDURE DIVISION.
  PERFORM HOUSEKEEPING-MODULE THRU HOUSEKEEPING-EXIT.
  PERFORM MAIN-LOOPING-MODULE THRU MAIN-LOOPING-EXIT.
  PERFORM END-OF-JOB-MODULE THRU END-OF-JOB-EXIT.
  STOP RUN.

HOUSEKEEPING-MODULE.
  OPEN INPUT DATA-FILE
    OUTPUT PRINT-FILE.
              •
              •
              •
HOUSEKEEPING-EXIT. EXIT.

END-OF-JOB-MODULE.
  CLOSE DATA-FILE PRINT-FILE.
              •
              •
              •
END-OF-JOB-EXIT. EXIT.
```

Typically, HOUSEKEEPING-MODULE and END-OF-JOB-MODULE contain only sequentially executable code with no looping or necessity for further performed modules. While this code meets the approval of instructors, the one-time PERFORM modules are unnecessary. Inserting the necessary code directly, in place of these two PERFORM statements, would still meet the original definition of structured programming, while increasing readability. The code contained in the modules would still be identifiable as a unique module. The reader benefits from being able to follow the top-down flow of the program without having to find and refer to the modules, which are typically located at the end of the program listing. While this example is simplistic, the illustration becomes increasingly valid as the size of the program increases. Readability is enhanced, which leads to a decrease in maintenance time and cost. Finally, program efficiency is increased, since statement flow is not forced to undergo four unnecessary transfers (the transfer to each module and the return from each module).

Example B.

```
SELECT-TAX.
  IF GROSS-PAY GREATER THAN 1200.00
    AND FICA-PAID LESS THAN 150.00
      IF STATE-TAX-DUE LESS THAN 100.00
        OR STATE-TAX-FLAG EQUAL 'N'
          IF DEDUCT-FLAG EQUAL 'Y'
            OR PRIOR-PAID-FLAG EQUAL 'N'
              PERFORM MOVE-DATA THRU MOVE-EXIT.
SELECT-TAX-EXIT. EXIT.
```

Example C.

```
SELECT-TAX.
  IF GROSS-PAY LESS THAN OR EQUAL TO 1200.00
    AND FICA-PAID GREATER THAN OR EQUAL TO 150.00
      GO TO SELECT-TAX-EXIT.
  IF STATE-TAX-DUE GREATER THAN OR EQUAL TO 100.00
    OR STATE-TAX-FLAG EQUAL 'Y'
      GO TO SELECT-TAX-EXIT.
  IF DEDUCT-FLAG EQUAL 'N'
    OR PRIOR-PAID-FLAG EQUAL 'Y'
      GO TO SELECT-TAX-EXIT.
  MOVE NAME TO SORT-NAME.
              •
              •
              •
SELECT-TAX-EXIT. EXIT.
```

Example B illustrates the unnecessary nesting of IF statements and modules due to the lack of forward GOTOs to the module exit. Without the GOTOs, it is not possible to bypass records that don't meet multiple selection criteria. Use of forward GOTOs does not violate the conditions of structured programming.

Modularity is maintained, since control never leaves the module except through the explicit exit. Selection remains between only two choices, depending upon the evaluation of the condition. Readability and program predictability are maintained, since the reader knows that the termination of each GOTO statement is the module exit. In fact, readability is enhanced, since all code is contained within one module, and an excessively nested IF statement is broken into its more easily understood components.

Example C illustrates the revised structure using the forward GOTO statements.

TEAM from SR/35

The design should explain the procedural steps in nontechnical terms rather than in terms of the target language. Statements that are close to code should be avoided except where absolutely necessary.

A short glossary of terms should be developed and used to avoid technical phraseology. If, for example, the target language is Cobol, use DO rather than PERFORM. Good, plain English makes the best design language. This is essential because the design becomes the documentation. By using plain English, the documentation can be comprehended by nonteam members as well as team members at a later date.

Most program design tasks require a maximum of two hours. Very complex designs may take longer, but when this occurs, team members should be alert to the possibility of dividing the design into smaller, more manageable tasks. It is far less costly to evaluate the design now than to develop and implement an ill-conceived concept.

When the design is completed, it is turned over to the programmer for coding. This programmer, it is hoped, has been involved in the design process, thus eliminating the need to acquaint him with the design. However, if the program must be assigned to a person outside the design team, the team should conduct a briefing with him before coding begins.

The programmer enters the design into the procedure portion of the program, using a text editor. The design is entered exactly as constructed by the team. This is documentation — not coding.

Design statements should be entered as comments. Statements entered in this manner create a simple list that becomes a program coding template upon which the programmer will insert actual code. The design is now ready for the next step — coding.

Using the template, or program shell, created in the previous step, the programmer codes the program by placing language statements between the comments. Do not remove the comments after coding; they should be left in to ensure future understanding.

Programmers are not permitted to add or delete a program module or to make major changes without consulting the design team. If, for some reason, a programmer finds that a design change is required, the team must review the situation and either make a design change or resolve the unclear details. This serves two purposes. First, it keeps a program design from being altered incorrectly by the programmer, and, second, it provides feedback to the design team, ensuring that they are fully aware of any design errors made.

When the program has been completely coded and the programmer has an error-free compile, a walk-through of the code is held with the design team. This is done to ensure that the program code actually does adhere to the design. This additional effort has proved to be beneficial in that it identifies errors due to misunderstanding the design. From this point, the program goes through unit and system testing.

Less time spent

The total amount of time expended in developing team-designed programs is less than that of individually developed programs. A typical program task can be team-designed with a manpower investment of three to six hours. The same program designed by an individual will typically consume eight to 12 hours if no serious errors are made. The team process develops a correct design before coding, whereas individually developed programs catch the mistakes after coding.

The design quality shows dramatic improvement through the use of team design. Team members rapidly develop into sound, knowledgeable designers. This applies to experienced as well as inexperienced personnel.

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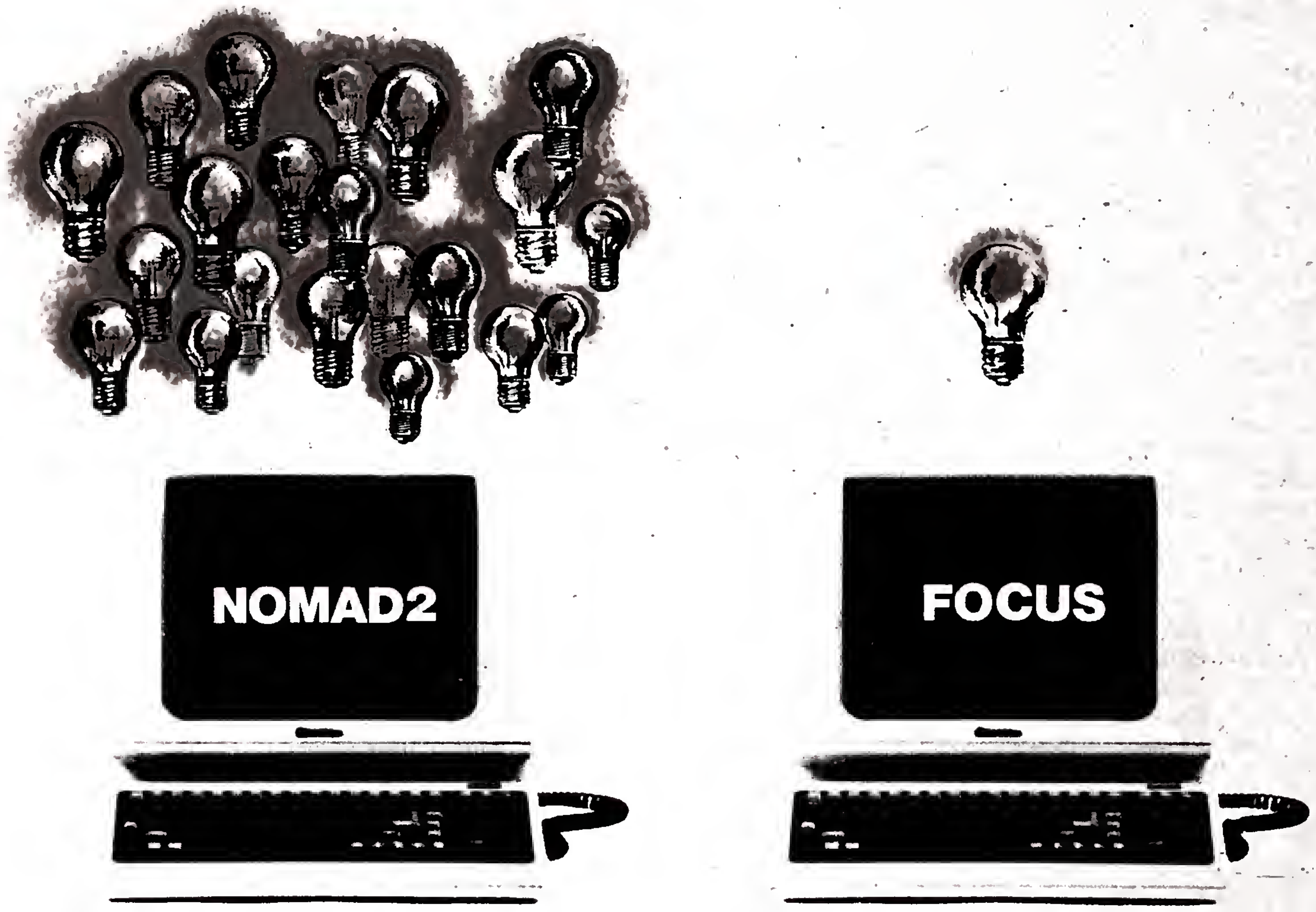

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System beefs up Hardee's DP operations

ROCKY MOUNT, N.C. — With 880 company-owned stores and 1,400 franchises, Hardee's Food Systems, Inc. has witnessed growth from a single restaurant in 1960 to over 2,000 restaurants today, ranking as the third largest fast-food hamburger chain in the U.S.

Don Gladwell, director of systems development for the firm, explained that increased pressure for productivity and responsiveness to individual restaurants have prompted both the acquisition of new software and the installation of new hardware.

Gladwell noted that the combination of a staff of 14 in systems development, with multiple and increasing application requirements, prompted a search for a tool to increase programmer productivity.

DP division

Hardee's corporate DP division includes the 14 people in systems development, with 27 people in technical support, communications and operations. Franchises handle their own data processing, while Hardee's DP division supports the company-owned stores.

The division provides services to all financial departments, including accounts receivable, payroll/personnel and others. An IBM 4331 and an IBM 4341, both under DOS/VSE with VM, are used to support standard business applications for financial departments. The company is now installing Digital Equipment Corp. VAX-11/750s in each of six area offices and one at corporate headquarters to service the marketing and restaurant operations.

Gener/OL, an interactive on-line program development system designed for use under CICS, was purchased in October 1983 from Pansophic Systems, Inc. Prior to the purchase, a number of CICS productivity aids were evaluated.

One package

"The main reason for our choice was that no CICS expertise was required for using Gener/OL, while all of the other packages required that knowledge. With Gener/OL, everything is done within one package, and there is no need to create links to CICS command-level code," Gladwell said.

Gladwell said that Gener/OL was used to develop a marketing system for tracking sales promotions that are done by the company. A recent promotion handled by the system was related to plush toys, where a kit was sold to each restaurant. (Both franchises and company-owned restaurants were obligated to pay for them.)

The individual restaurants could choose from a variety of displays and could buy as many as needed. The orders were entered into a sales order system, and an invoice was generated. Both the entry of sales orders and any inquiry into the open order file were accomplished using Gener/OL.

Gladwell said that prior to the use of Gener/OL, the entire procedure was a manual effort, which did not allow a timely response to individual restaurants.

"The new marketing system is much more efficient as both a tracking mechanism and as a tool for quick response to the restaurants involved," he noted.

Increases in programmer productivity may be directly linked to the use of Gener/OL, Gladwell added.

Gladwell pointed out that Gener/OL eliminated discrete steps. "We used to have to format under DMS and write CICS command-level Cobol programs under another product. We had problems linking the two. We have eliminated the passing of attributes back and forth by using Gener/OL."

In addition to the new software, Hardee's is also installing new hardware.

"We are now putting in DEC equipment [VAX-11/750s] around the country, one in each [of the six] area offices," Gladwell said. "Each area office is treated as a separate company and has up to 200 restaurants that it is responsible for. One VAX will be installed here at corporate, and the corporate unit will control the entire network. There will be no operators in the area offices — the entire network will be run from corporate using Decnet.

"We are decentralizing the reporting for restaurant operations so that we can get more timely information to the field," he added. "This allows each area office to identify the problems in its business more quickly. For example, if management has too much labor in a unit, compared with sales generated, or if a manager has too much menu waste, the information would be relayed to the field much faster."

"We are in a very fast-paced business, having gone from one restaurant to over 2,000 in a little over two decades. Gener/OL allows us to provide our users with viable systems in a shorter time frame, despite the tremendous growth of the company, and the DEC equipment will help to make reporting even more efficient."

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Development life cycle has 10 milestones

By Gary Guttman
Special to CW‡

There are 10 major milestones in the systems life cycle development process:

- Defining goals.
- Expressing the design of the application.
- Preparing for production of the system.
- Producing the system.
- Testing the system.
- Parallel testing the system.
- Documenting the system.
- Installing the system.
- Maintaining the system.
- Making major enhancements to the system.

It is most important to define goals, and the end user of the application must be deeply involved in this process. Most often, the scenario that occurs in an application development effort is as follows: The systems development people meet with the user, discuss his needs and then produce a document defining the goals of that application. This document then becomes a target toward which the systems development activity drives.

It is very important that the user be directly involved in, and contribute heavily to, the defining of these goals. The user must understand what the proposed system is, and there must be a feedback mechanism built in to allow goal definition to change through the early development cycle.

> *Automated application development technology allows pieces of the system to be prototyped. Application developers must be able to change direction quickly to meet application needs as the business itself changes, as government regulations change and as the competition changes. Prototypes that are built should be able to be used as building blocks — not just as throwaways that demonstrate a process in order to define it.*

Once the initial goal definition has been achieved, produce a document that contains these goals. This document must be agreed upon by both the user and the application development group.

Next, analyze the system so that its design can be defined. To do this, decompose the system into its functional components. There are many methodologies that espouse different forms of decomposition, any of which, if applied with discipline and rigor, will work well within a given organization.

Two major approaches are chronological decomposition, where a development or application is viewed along a time line within an organization — without regard for function classification; and functional decomposition, where development of the activity within a single area is looked at.

It is next desirable to do a data flow analysis. After this, the system can be broken into functional data processing groupings, such as reports, screens, data base segments, files, programs or processing modules.

First prototype the application by painting end products, such as screens and reports, in a form that can be understood by both the end user and the DPer. Continually redefine these end products until the definition is complete and satisfactory to the end user.

System development

The next phase is the preparation for system development. Application generators enable quick response to changes and production of applications that can be tested relatively easily and that can then be moved quickly into production. They also produce operational documentation and user-interface documentation before the actual system production phase itself. Debugging user documentation is as significant as debugging the programs.

The production phase concerns program production, job control language production, macro program generation, communications interface generation and data base interface generation. Changes that are necessary to meet the business objectives of the application should still be allowed at this stage.

Next comes the actual testing and parallel testing of the system. This moves very rapidly because the code produced by an application generator is highly tested and prone to error only in procedurally generated areas. Automated application development technology allows pieces of the system to be prototyped.

Application developers must be able to change direction quickly to meet application needs as the business itself changes, as government regulations change and as the competition changes. Prototypes that are built should be able to be used as building blocks — not just as throwaways that demonstrate a process in order to define it.

Technical documentation of a system is critical to the ability of an organization to maintain the system on an ongoing basis. It should be produced by the application generator and contain such information as a complete data element cross-reference and an index that is automatically produced.

The system can then be brought into production relatively painlessly.

System maintenance

Next comes the system maintenance phase. This typically involves the areas of error correction; oversight correction; minor modifications to the application to make it more responsive to the user; and global modifications when it is discovered, for example, that a particular field on a report is not large enough to hold the data that is generated during the use of the system.

Then, inevitably, comes the major system enhancement phase.

Not infrequently, once an application is brought onstream, a new string has to be added to the application to handle a new area of processing that was not originally included. These types of major enhancements are always more difficult and more expensive using traditional methodologies than application-enabling tools.

Finally, we have the area of redevelopment of the system. Even though a system is built in a modular fashion, and an application generator is used, there comes a time when it may be necessary to reimplement that system. An application generator will allow us to take those parts of the existing system that remain useful and bring them forward into the new system at almost no cost.

Guttman is president of Generation Sciences, Inc., a New York-based company that markets application generators.

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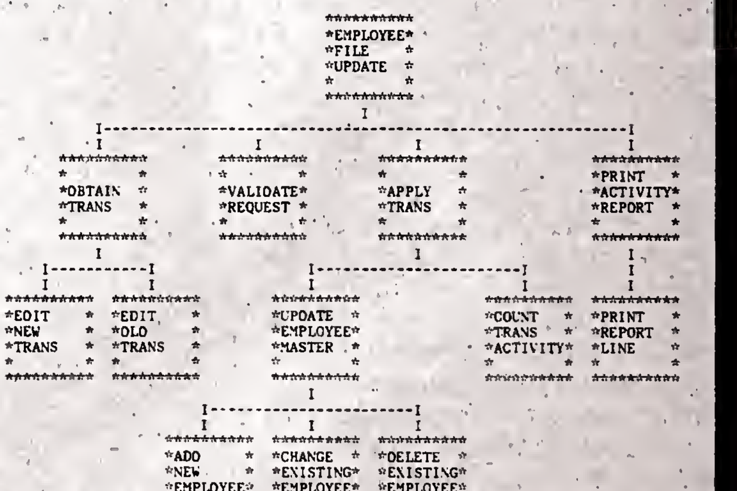

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People skills extend DP effectiveness

Technical prowess not sole talent needed in career advancement

By Paul A. Martino
Special to CW‡

DP has always been and has always projected itself as a highly technical area. The need for tight logic and precise definition has led to the extensive use of technical terms that add to this image. While a technical vocabulary has been quite useful in exchanging ideas about technical developments in the discipline, it has had two undesirable side effects.

The first of these is that it conveys DPers as an aloof, arrogant and almost mystical group to anyone outside DP. This helps to contribute to less desirable attitudes toward DP — attitudes ranging from apprehension to overly optimistic expectations.

The second difficulty is within the discipline itself. The constant need to keep abreast of the advances in hardware and software technology causes an overemphasis on the technical tools of the trade at the expense of others.

Ambassador of change

On a broader plane, the role that DP serves within the user community is that of an ambassador of change. It helps the user community accomplish its objectives more effectively by bringing it information technology. It interacts with a community whose skills and knowledge are different from its own and that has a vastly different vocabulary. DP serves as the interpreter of information technology for this community.

On occasion, it finds itself in the middle of a conflict of views held by users of divergent purposes. Many times it is called upon to communicate under difficult and stressful conditions. All of this has as its end the bringing about of some useful and beneficial change.

It is important to understand the foundation from which DP careers have developed. These careers typically proceed from the more technical at the programming level toward increased human interaction at the management and analysis levels.

Different talents

Talents that serve a programmer well, such as logic and strong attention to detail, can be an impediment and a source of frustration while attempting to make the transition. Programming is logical and predictable, but users are emotional and spontaneous.

Moreover, a failure while engaged in programming tasks is an expected and easily dealt with phenomenon. When similar failures occur in the more human activities, however, they are often looked on as a personal failure or disgrace. The emotion associated with this type of failure often clouds the ability to deal with it for what it really is: a bug in the human system.

Where new technologies have been concerned, such as the introduction of CICS into a shop, the importance of adequate training is obvious. A vast range of alternatives, from seminars to textbooks, to programmed instructions and to mixed media sessions, is readily available from which to choose. Nontechnical skills have been dealt with less completely, and are often even difficult to identify as skills. Meetings are such a commonplace occurrence that the skill involved might not be obvious to someone who has to run one for the first time.

An attempt to categorize the various skills required as one advances through a DP career leads to a rather impressive list. In part it would include: writing, speaking, presenting, listening, interviewing, planning and organizing, negotiating, dealing with difficult situations, researching and conceptualizing. Each skill can be a crucial ingredient to the successful completion of a project. Yet it is difficult to develop a list in which the training in these areas is technical training.

The collection of skills necessary to improve performance in these aspects can be learned by methods other than trial and error. The challenge to the DP industry will be to locate and establish adequate training in these nontechnical areas.

Martino is vice-president of Kieffer, Martino and Associates, Inc., a Cheektowaga, N.Y.-based consulting firm.

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Source code library maintenance stacks up

By Richard J. Schmitt
Special to CW‡

While concentrating on productivity enhancements in creating new source code, many programming supervisors ignore a major concern of their technical staff — the management of existing code.

What good does it do to generate new systems with state-of-the-art tools if we then lose or inadvertently modify the resulting software?

Although source code library management functions lack the glamour and glitter of application generators, they substantially impact the 50% to 80% of the total programming work force assigned to program maintenance.

In fact, if proper library control can save a modest 5% of the maintenance staff's time, the savings to the total programming effort are equal to a software development tool that makes system developers 10% to 20% more efficient.

Mismanagement of source code is not a particularly new issue; losing sets of instructions was with us long before computers. (Music historians estimate that half the works of J.S. Bach were lost through the carelessness of one of his sons — perhaps the predecessor of the modern-day contract programmer.)

Today, few maintenance personnel will guarantee that they can find source code corresponding to each production load module in even the most critical of a corporation's systems.

Unlike most other software concerns, the situation of missing or inaccurate source code is becoming worse. Ironically, this is due to the fact that programmers are becoming better at what they do through the use of more sophisticated tools. A few years ago during the dark ages of code creation, programmers had few tools: a keypunch machine, a line editor of sorts and probably a library maintenance tool. This very lack of tools simplified library maintenance.

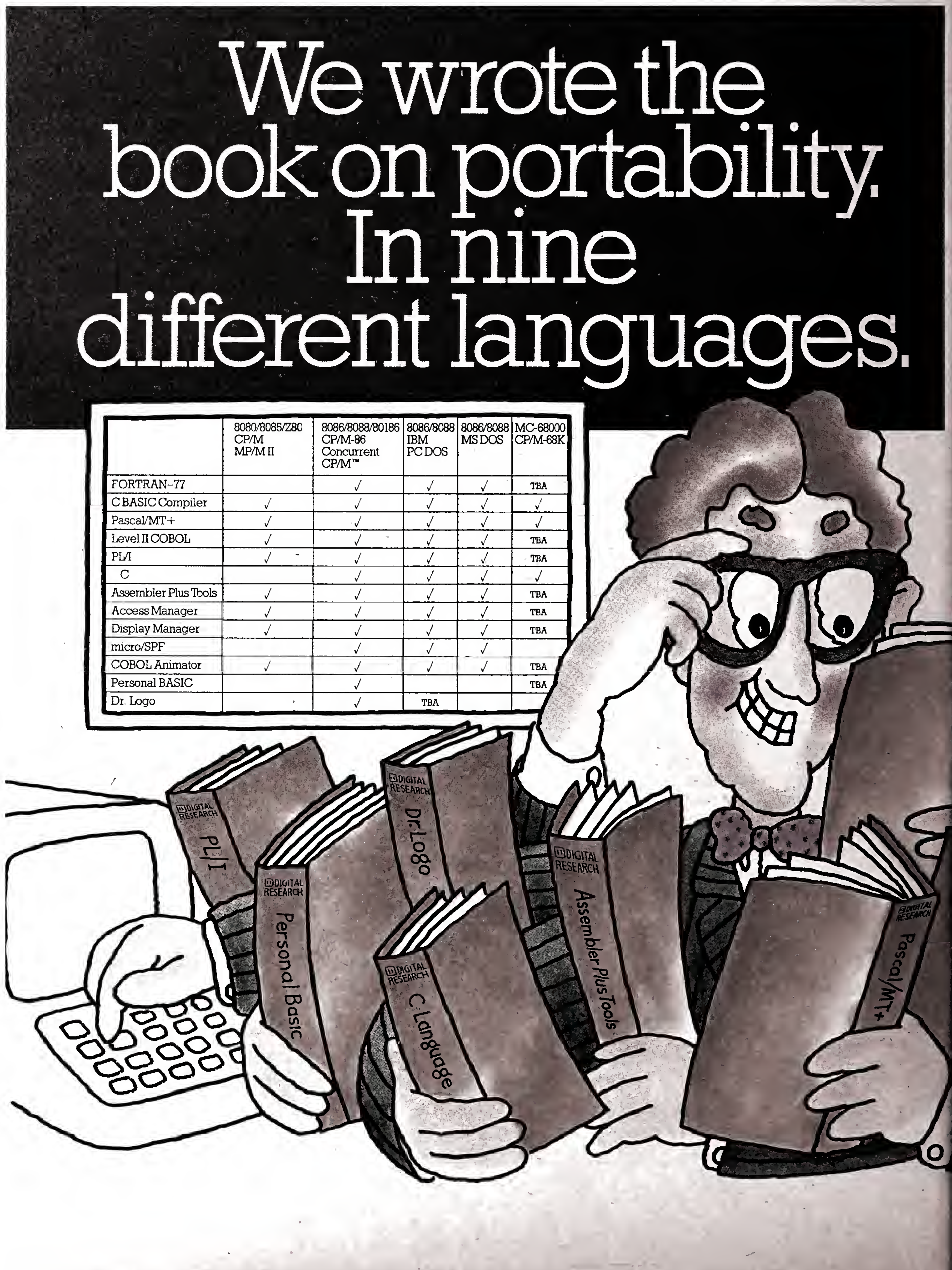
Nowadays, cheap CPU and disk space, coupled with powerful on-line editors and other programming productivity tools, seriously threatens library integrity. We now have situations where several slightly different versions of production programs reside in individuals' private libraries. When two or more programmers attempt to change the same production load code module, changes made by the last programmer will overlay any changes made by his colleagues in the time period since the last update's copy of code was extracted from the library.

This update-all phenomenon is the newest threat to the integrity of production source code, but other problems remain that have been with us since the early days of program maintenance:

> *Music historians estimate that half the works of J.S. Bach were lost through the carelessness of one of his sons . . .*

- Why was source code changed? Knowing the reason for changes often makes even the most obtuse code understandable to those who must perform additional maintenance in the future.
- Who changed the source? Programmer skills vary. When things go wrong,

Schmitt is a data base administrator for Exxon Corp. in Houston.



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Pascal/MT+	✓	✓	✓	✓	✓
Level II COBOL	✓	✓	✓	✓	TBA
PL/I	✓	✓	✓	✓	TBA
C		✓	✓	✓	✓
Assembler Plus Tools	✓	✓	✓	✓	TBA
Access Manager	✓	✓	✓	✓	TBA
Display Manager	✓	✓	✓	✓	TBA
micro/SPF		✓	✓	✓	
COBOL Animator	✓	✓	✓	✓	TBA
Personal BASIC		✓			TBA
Dr. Logo		✓	TBA		

impressive returns on modest investment

changes made by certain members of a project team will be examined with more scrutiny than those made by more reliable maintenance staff.

■ When was the change made? A programmer called in the middle of the night to repair a once-reliable module will first check the most recent modifications to see if they have inadvertently triggered the abend situation.

■ What lines changed? Analyzing these is usually more effective than tracing through entire programs.

> *. . . perhaps [Bach's son was] the predecessor of the modern-day contract programmer.*

How can this dilemma be resolved without depriving programmers of the productivity tools that have allowed them to increase their output so dramatically in recent years? Fortunately, a number of steps are available to most shops large enough to suffer from the problem. The answers often lie in applying software capabilities commonly found in medium to large programming environments.

First, examine the project's library policies. Chances are they were formulated back in the line-by-line update days and can no longer handle the complexity of the update-all editors.

Second, use existing software to ensure that source and load code modules are synchronized.

Third, have project management make sure that the staff is aware of and uses the source code audit trails available in their present editors.

Additional steps may be taken that will require more resources than simply making use of existing software. The outlay is usually quite modest when compared with the $50,000 to $200,000 spent to purchase development productivity tools.

Consider purchasing a program that compares two versions of source code. These are readily available on the market and are reasonably priced. When a programmer puts a modified program into production, this software will compare the updated version with the current production source.

Better yet, keep the output of these runs in a file (either on-line or attached to the program's folder in the documentation library) so that a line-by-line change history for the program is maintained.

Build a log of why the program was changed (such as a reference to a project control number), who changed it and the date it was changed. This could be something as easy to implement as a simple copy step in the production compile procedure or as sophisticated as an update to the program's information on the installation's data dictionary.

As much as possible, integrate these procedures into the programmer's existing tool kit. For instance, if your shop has taken the trouble to create screens to compile and link programs, take the additional step to update the log suggested above and run the source code compare. This way, the project staff can have the benefits of enhanced library control without expending any more effort.

Finally, consider what it would take to ensure library control. The responsibility for updating source code could be rotated among project team members.

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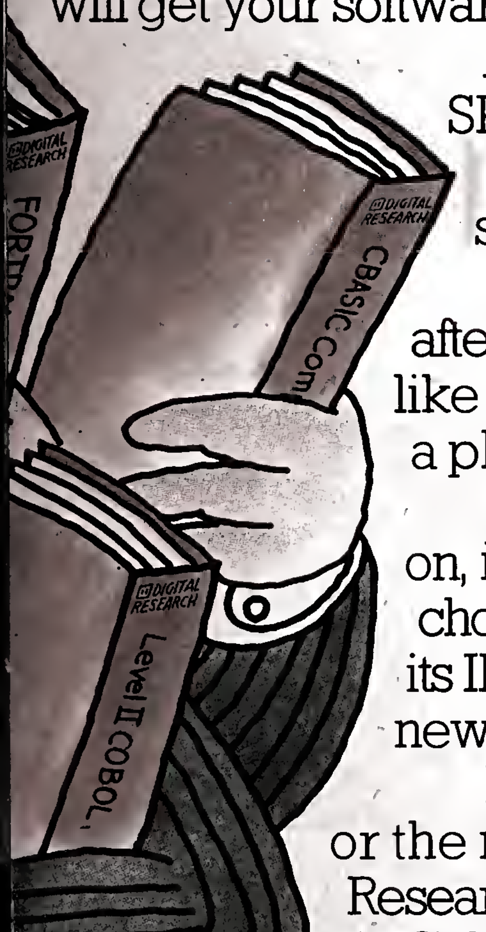

Secret to cutting backlog? Write less code

By Naomi Lee Bloom
Special to CW‡

Other things being equal, the less code written to achieve a specific level of systems support, the less risk, cost, elapsed time and staff frustration. It is important to note, however, that other things are rarely equal.

One almost universal, but only moderately successful approach to reducing application backlogs has been to improve the productivity of scarce technical resources. A more promising approach to meeting user application needs may be to reduce substantially the amount of new code needed to satisfy these needs. Such application-enabling techniques, to use a phrase that seems to have originated within IBM, are intended to reduce the amount of new code written, rather than merely expediting the production of new code.

Other things being equal, the less code written to achieve a specific level of systems support, the less risk, cost, elapsed time and staff frustration. It is important to note, however, that other things are rarely equal. Many of the techniques described below substitute increased consumption of computing resources for reductions in the personnel resources needed to achieve a certain level of user support.

There is nothing very mysterious about finding ways to write less code. You can:

■ Convince the user not to want (or need) a new application.

■ Reuse old code — your own or someone else's.

■ Use simple tools (remember how levers work?) to multiply the work value of any code you write.

■ Get someone else, perhaps your users, to write the code for you.

The key to successful application-enabling is to build these concepts into your systems development life cycle methodology. Custom development or even package installation projects should not be initiated unless the new application is really needed. And at every stage of the life cycle, you must ask yourself what alternatives exist to developing new code. Thus, application-enabling techniques parallel, in some sense, the systems development life cycle.

The most obvious solution to the problem of how to write less code is to eliminate from the backlog all but the essential applications. Strategic systems planning is the process by which an organization identifies and prioritizes its major systems development objectives. By explicitly aligning systems development priorities with the organization's business strategy, we take a critical first step toward reducing the amount of new code to be written. To repeat, if you don't develop unnecessary applications, you will not be called upon to write (and maintain) worthless code.

Where an application is justified, there are several possibilities for developing it without writing any code or by writing only a small amount of simple code. Application software packages have been available for nearly 30 years, and many routine business and system functions are very adequately supported by such packages. Before deciding that an application is so unique as to obviate using any existing code — a common attitude among many in-house analysts and users — consider the many flavors of software packages and reusable in-house code.

Currently available commercial applications and systems software can be divided into three general categories. Traditional software packages perform a well-defined set of functions with minimal installation options. Contemporary software packages perform a well-defined set of functions subject to many table-driven, user-defined and/or installation-specific options. And adaptable software packages perform a flexible set of functions subject to many table-driven, user-defined and/or installation-specific options.

Written to be customized, contemporary packages have well-documented source code constructed to support low-risk user modifications. Such packages also use reference tables to remove from the source code the most frequently customized functions, such as report headings and, in some cases, formats, message code literals and severity levels; data element names; field lengths; data types; edit rules (including pointers to other reference tables of valid values and code translations); and pa-

See **CODE** SR/50

Bloom is a senior principal of American Management Systems, Inc. in Arlington, Va.

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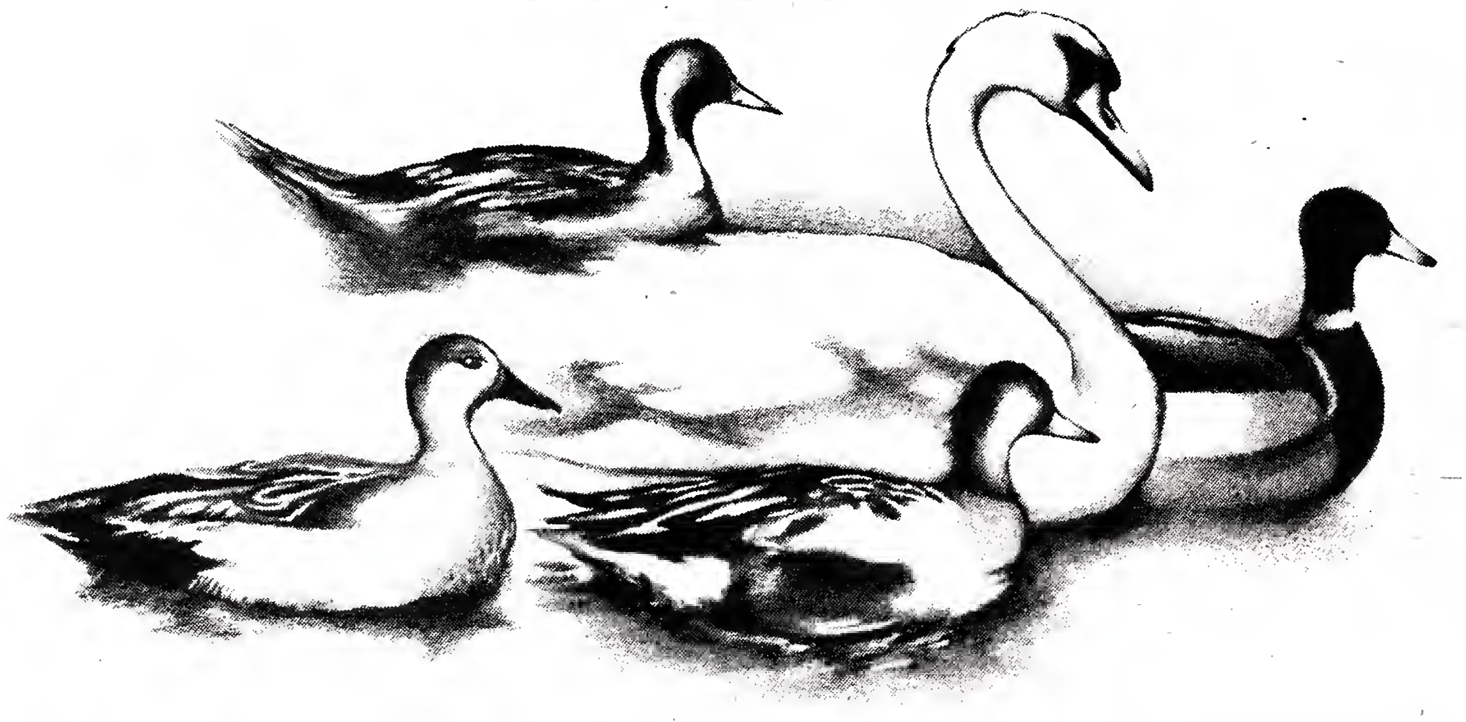

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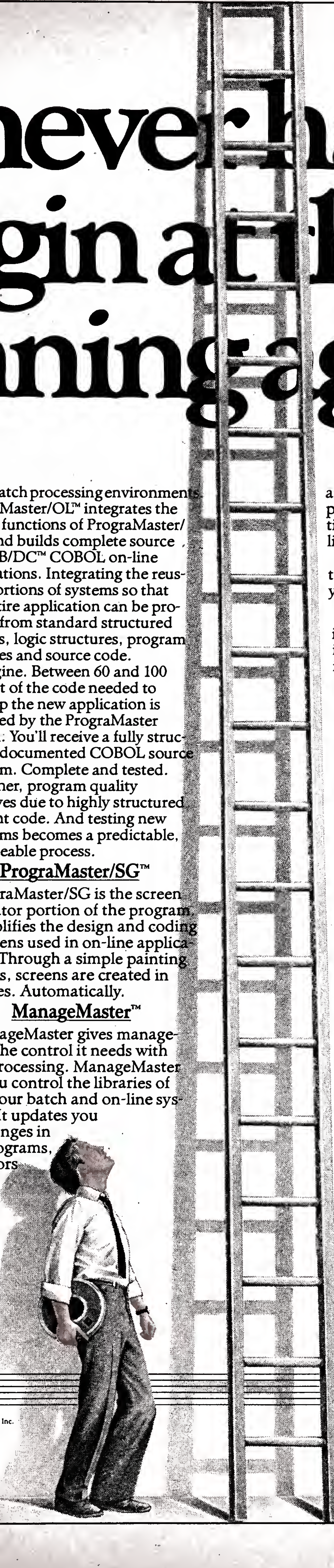

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Prototyping gives users more enthusiasm

For DP, working model serves as tangible and flexible aid for application development

By Pat Messerich
Special to CW‡

With all due respect to the proponents of structured methodologies and to those software consultants who perpetuate the methodology propaganda, spending more time on specification design is not the solution to improving software performance and application development efficiency.

In spite of the wide acceptance of such methodologies, industry experts such as James Martin point out that 82% of the effort spent debugging an application in a typical MIS department today is still spent eliminating bugs that were introduced during the requirements specification process. Another 17% will be spent on bugs introduced during detail design. Only 1% of the debugging is spent on bugs created in the coding phase.

Merely increasing the user's up-front involvement and spending more time on traditional design will not solve that problem. In fact, we already spend too much time on design specifications.

Increasing the efficiency of the application development process — and the usability of the finished applications — boils down to improving the efficiency of the communication process between the people who are going to use the system and the people who are going to build it.

Think back to the last project you started. Remember the enthusiasm and excitement of those first few meetings. DP was anticipating a new challenge, and the users were happy to be getting their system finally underway.

Now think about how quickly the excitement faded and how rapidly the users were drained of information. Remember how tough it was to overcome the apathy toward specification review meetings; how, even when the users came to the meetings, no one had really read the specifications, and their sign-off often did not really signify either understanding or approval.

Increasing up-front user involvement certainly will not remedy that situation. The difficulty with the traditional application development life cycle is that both users and DP professionals get tired of intangibles. We all want to see something that we can touch and test and use, something that captures the essence of the design, not just more paperwork that merely describes it.

> *Increasing the efficiency of the application development process — and the usability of the finished applications — boils down to improving the efficiency of the communication process between the people who are going to use the system and the people who are going to build it.*

Change needed

At least subconsciously, DP professionals have embraced conventional design methodologies as much for their value in preserving the mystique of the profession as for their contribution to improving performance. We've got to change our own philosophy, and the change we need is a wholesale commitment to the philosophy of prototyping.

Prototyping allows us to take whatever information we gather during the first few enthusiastic meetings, and, instead of coming back with increasingly voluminous and detailed stacks of specifications, we can come back with a tangible application that the user can touch and try. Then the user can knowledgeably suggest changes that will improve system performance, and then we can proceed to incorporate those changes with a clear understanding of what exactly needs to be changed and how it should look at the end.

This method will work since we prototype now. We just call it enhancement and maintenance.

A lot of useful information comes out during the system test and benchmark phases just prior to putting a finished application into production. The information is generated because the user finally gets to see, touch and use the finished product.

For years, DP professionals have lamented the fact — and actually talked themselves into believing — that the reason users do not like finished systems and want long lists of changes is that they only gave half the information in the first place, and at least half of what they gave was wrong.

That is certainly an exaggeration, but even if it were true, after 20 years of experience, maybe we should accept that this is the way it is going to be and change our methods to accommodate that fact.

It is time that DP admits that too often the finished product put into production is really built in seclusion. After the user signs off on a set of frozen specifications, he retires to write code that is really only based on a series of "best interpretations" — our best interpretation of what the user wanted, their best interpretation of what the specs meant, our best interpretation of their comments and questions and so on and so forth.

It is no wonder that most first production versions are nothing more than first prototypes and that the ongoing maintenance and enhancement phases are really just continued prototyping.

Unfortunately, while we are refining the product, the poor user, as well as the corporation, has to make do with the production prototype until a new version can go through the entire process again.

As long as we are going to prototype anyway, why not make it a methodology, organize it and use it to our best advantage? By definition, an effective application development methodology must:

■ Provide for an iterative approach and allow easy reiteration.

■ Provide for specific and appropriate communication with all departments affected by the development.

■ Provide a system for accommodating changes based on decisions and approvals made in a step-by-step manner.

■ Provide documentation of each step and decision.

■ Facilitate project management by establishing milestone and reporting systems.

The fact that there are so many methodologies in use makes an interesting comment on their effectiveness. But accepting and enforcing the rules often cause for more problems than they alleviate.

Structured methodologies all suffer from a fatal flaw. Although they claim otherwise, they do not accommodate change. They are really designed to prevent it. Their basic tenet is to freeze design specifications at some point and to move unflinchingly forward through the remainder of the development process.

That is all right, provided that the specs are perfect, fully describing all aspects of the required system, and that they are completely understood by the user, the analyst and the programmer.

Unfortunately, as Martin's statistic on specification problems highlights, the specifications are far from perfect. They are often misunderstood, and freezing them at any point before the application has actually been tested generally means freezing in problems that will have to be taken out later.

Prototyping is actually the best way to meet all the criteria for an effective methodology.

Together, DP, users and all others involved can touch and feel the tangible application and suggest changes based on what they see and experience, not what they read or interpret. Each change can be tested through interaction, not imagination.

Most importantly, from a project management standpoint, each change is specifically based on decisions and approvals relating to the preceding version, and all can be easily documented.

With prototyping, communication during the application development process is bound to improve because it is based on facts, not fantasies or fallacies. Since the finished application will meet the user's needs more precisely, perceived quality and satisfaction will improve, maintenance requirements will drop and the useful life cycle of each application will increase.

Since maintenance and enhancement now typically occupy between 70% and 80% of staff time, successful implementation of prototyping will free tremendous resources to apply against the backlog of outstanding user requests.

By adopting the prototyping approach, users, DP and the entire corporation benefit. By remaining dedicated to the constraints of conventional methodologies, DP will not be able to bridge the gap between user demand and DP resources. The backlog will continue to mount, end-user frustration will continue to increase and DP will inevitably and unavoidably lose control of the corporate information processing environment.

Time has come

The time has come to recognize the short- and long-term advantages of prototyping and to embrace the new generation of tools and methodologies that make it a technical and economic reality.

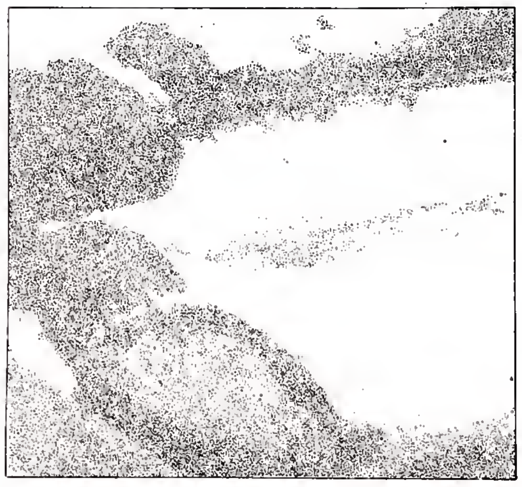
Prototyping is not a new concept, but until recently it was generally viewed as cumbersome. Basic application skeletons could be created relatively quickly, but all they did was show the user how screens and reports looked, not how they related and reacted to one another when actually connected by code. There was no way to be sure of the results that the application would produce. That is just doing the typical specifications without the three-hole punching.

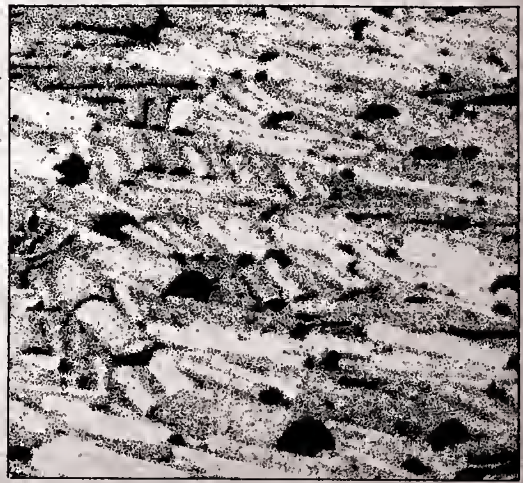
Why go through tedious and lengthy iterations of specifications when more can be accomplished in less time at less cost through a series of working models? Why require users to read specs when they can observe an operational test? Why force them to imagine required changes when they can easily envision them through interaction with the prototype?

Prototyping is the most effective form ot two-way communication available to the DP industry. It is time for us in DP to abandon the prejudices and practices of conventional application development and embrace the power of prototyping.

Those companies that do will be on the leading edge of progress within the industry. Those that do not will see the industry pass them by.

Messerich is vice-president and director of research and development for the Business Products Division of Analysts International Corp., a software development consulting firm based in Minneapolis.





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rameter values such as process scheduling dates, current withholding tax percentages and airline overbooking percentages.

The purchase and use of contemporary or adaptive application packages generally reduce the costs, risks, elapsed time and personal frustrations of meeting systems support needs. However, there is always a price for flexibility. Sophisticated reference tables can require considerable loading and maintenance effort. But this approach is far less risky than modifying source code, and users can often be encouraged to take responsibility for loading and maintaining most of the tables.

From the perspective of cost, risk and the containment of elapsed time, the availability of options means someone must analyze, document, recommend, evaluate and decide upon each desired option. Contemporary application packages go a long way toward meeting organization-specific requirements without developing new code.

There are two general approaches to multiplying the value of any code you do write. Extension software uses your simple code written in the tool's own command language as the input from which it creates (by translation, compilation, assembly or one of several other extension techniques) very substantial functionality. Report writers are a common extension technique.

Conservation techniques are a formal set of design techniques that look for the common functional elements in an application in order to develop a single implementation of these common functions for use across the application. Reusing date routines is a very simple case of conservation.

The universe of extension software ranges from the old and familiar to the new and still developing, including:

- ■ Utility programs that provide system or housekeeping functions.
- ■ Report writers and inquiry languages, including graphics packages.
- ■ Data base management systems with which you use simple commands in the application programs to invoke powerful data handling, editing, storage and access capabilities.
- ■ Screen generators.
- ■ Data management and analysis tools.
- ■ Application generators.
- ■ Very high-level languages.

However, there is a significant problem currently associated with the use of extension techniques. Until considerable standardization occurs, taking advantage of even a small set of these tools will impose a serious training burden on your organization. Many professional programmers and users will resist using these tools because they quite reasonably perceive that the cost of mastering them is too high.

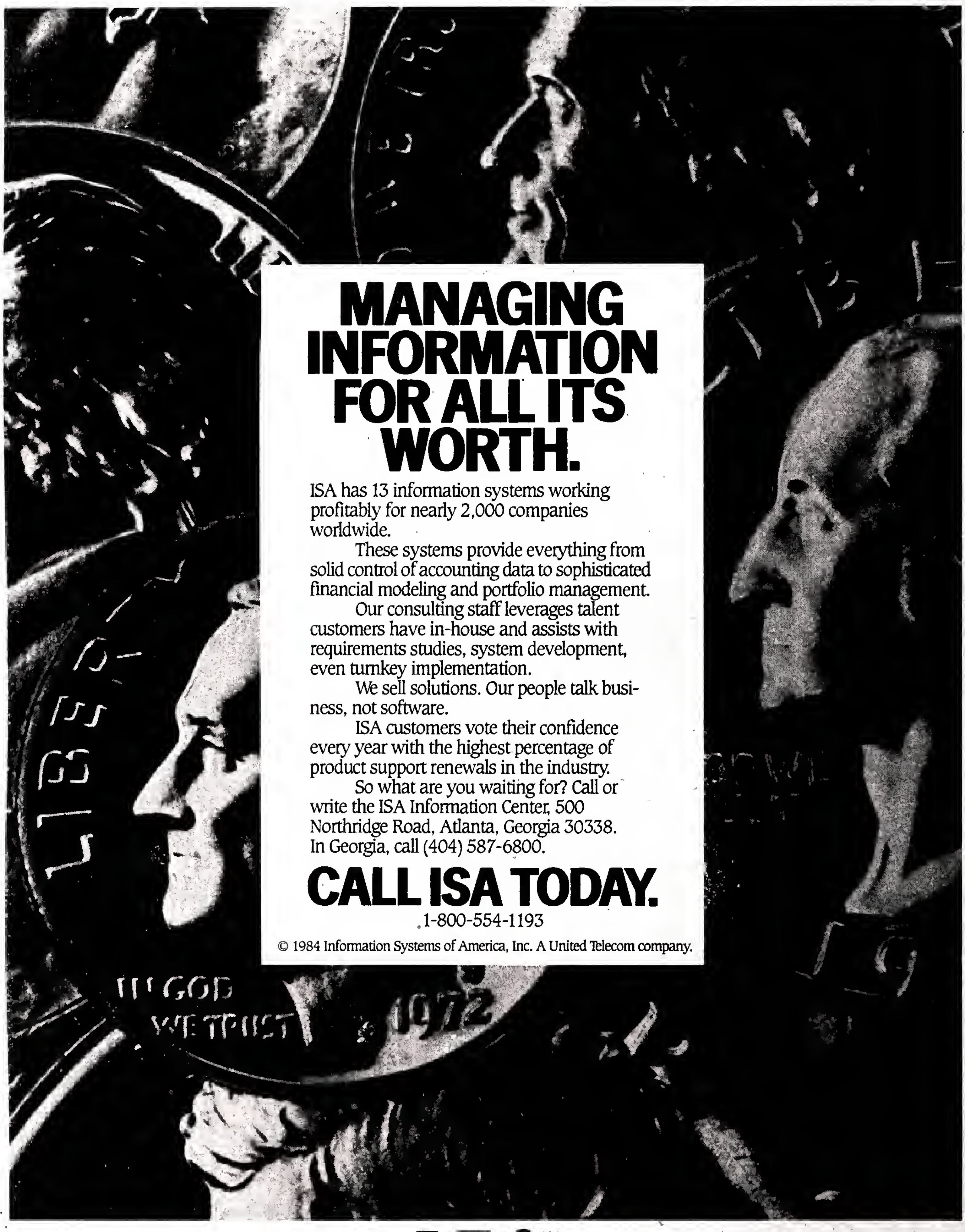
Perceptive analysts and designers have always recognized common functions in their application specifications, but the process of doing so has been largely informal. Many business applications contain a rather large set of common functions that lend themselves to a common software approach.

The decision to build an application around a base of common software modules must be made explicit quite early in the design process so that all further effort can be efficiently directed.

End-user computing is not a new idea, so why do we now treat it as a state-of-the-art development? One reason is that, until now, whoever approached the computer was forced to learn computerese — at great personal sacrifice. If we believe the advertisements for various end-user computing tools, the professional programmer may soon focus solely on core production systems and tool development, leaving to the user the development of most data extraction and analysis systems. Clearly, if the user can directly translate his unspoken information requirements into a working system, he won't have the DP staff to kick around any more.

If only to sell more computers, hardware vendors would welcome any approach to program development that used more computer resources to leverage scarce personnel to develop new applications that used more computing resources. Since they develop many of the packages and tools and generally corner the market on really superb professional programmers, software vendors certainly favor the techniques described here. Corporate users and DP managers are also on board the write-less-code bandwagon.

Time is clearly on the side of the approaches described here, but I would not yet discharge my Cobol programmers nor declare that all user needs can be satisfied by a new data base management system. As in all things, a balanced mix of these techniques with more traditional application development strategies will produce the best results.



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A tale of two languages: Mumps and RPG

By Emily R. Myers
Special to CW‡

How does a childhood disease compare with a report generator? The question is not often asked because Mumps, the programming language, and RPG, one of the original tools for user access to information, are not generally used for comparable applications. RPG is commonly used for accounting and business applications and Mumps for medical and scientific applications.

This is the tale of identical applications written in two very different languages. There are two major productivity issues when choosing system development tools. The first issue is the suitability of the language facilities to the task at hand, and the second is the efficiency of code production as a function of numbers of levels of indirection.

Although RPG was developed in an era when user access meant report writing, one of its major limitations persists and is implicit in high-level query languages. RPG as a compiled language on the IBM System/38 is surrounded by many auxiliary utilities that must be used together to produce an application.

Command language program

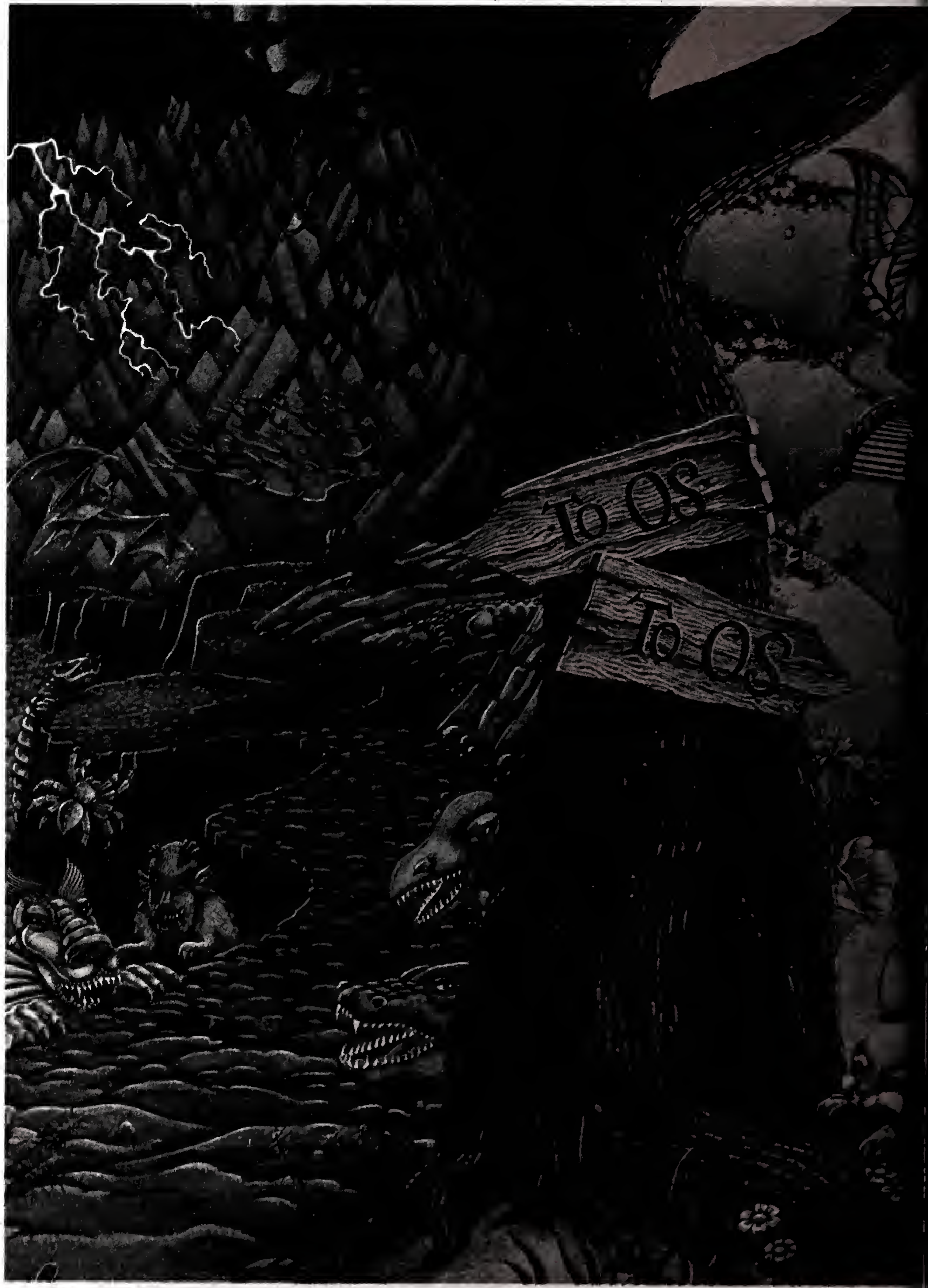
A command language program is used to link together RPG objects so that they can be evoked from a menu. The screen formats are defined via a screen development aid that allows the user to lay out the screen format, the format being a file that is referenced by the RPG compiler. The final component of an executable RPG application is the external file definition, which, just as in the screen format, is referenced by the RPG compiler. Screen and file formats must be compiled themselves prior to the actual RPG compilation. As easily imagined from the components, the compiled programs need not execute in main memory.

Similar to Basic with respect to programmer productivity, Mumps has a somewhat elegant file access method. When implemented on a minicomputer, Mumps is a stand-alone operating system/interpreter and language. In this environment, many small (2K- to 4K-byte) programs are serviced concurrently in fixed partitions by an approximately 30K-byte operating system. Service may be the execution or entry of a program. There are often no languages or commands available other than the Mumps commands. There are fewer than 26 commands in most cases, so a command can be referenced by its first letter in order to save space in the programs. . .

Two accounting functions, accounts payable and general ledger, were exactly duplicated in Mumps and in RPG by the same programmer for the same users. Therefore, the languages can be compared specifically with respect to their effectiveness as development tools.

The chart (see SR/53) is labor-intensive on the RPG side of the ledger. If the applications could be broken down into two components — on-line data entry and batch reporting — each language would have a superior attribute. Screen handling, on-line data entry and retrieval are more efficiently dispatched with the Mumps language. Voucher entry illustrates the on-line ease by the 150 vs. 750 lines of code. Once the files have been created, RPG and the IBM System/38 data base management system do a powerful job of multiple-path accessing for relatively easy reporting. The accounts payable distribution report shows 90 vs. 220 lines. But not reflected in those numbers is the ease with which the file, now created, can be reorganized for various reporting needs.

The differences between interpretive and compiled languages have been discussed in many forums. The delay of compilation was less of a



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	MUMPS	RPG
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Accounts Payable Distribution Report	90 lines 2 programs	220 lines 4 objects
Total programs	50	200 objects File Descriptions CL Programs RPG Programs Screen Layout Files Data areas

problem than the number of objects that required compiling. In a one-program-for-one-program situation, the delay of waiting for the compile would have been trivial with respect to total development time, but the fact that a function required compilation of several components was responsible for contributing increased development time to the RPG on-line functions.

The benefit of the RPG independent component and compilation was realized in the batch portion of the application. An externally described file can be referenced for report writing. Also, logical views or multiple-path accesses to a physical file can be maintained on-line or in batch mode as requirements dictate.

Mumps files offer multiple-path access to files, but each program must have knowledge of the file structure rather than use an external reference or description of the file. The Mumps programmer is responsible for the maintenance of the access paths, whereas the external file definition used by RPG maintains the paths. The determination of on-line or batch maintenance is made within the external file definition itself.

The two systems each excel in the function they were designed to do. Mumps runs a lot of terminals on very little hardware and, with additional savvy, an elaborate file structure. Screens are byte-in, byte-out, and data can be placed at will throughout the system. RPG addresses large data bases with ease and handles terminals with a little added programmer patience. The screens are block mode and oriented toward a record, thus a file and multiple files can be accessed by one screen. The choice here boils down to determining whether the majority of the processing requirements mandate facility of input or of output.

Both languages are able to produce the specified function. The programming effort increases when the language is less suited to the job to be done. Sales analysis is an application where input is trivial, but the output must be massaged many ways for the myriad reports for management analysis. A programmer could program this application more quickly in RPG than in Mumps.

In contrast, for order entry, the use of easy screen access is more important than being able to look at the data many ways. If the customer placing an order is to be immediately advised as to whether the product is available, or if the company wants to check the customer's credit prior to committing to ship, the screen handling and multiple-file concurrent access are the critical language features. Therefore, order entry could be programmed more easily in Mumps than in RPG.

The second productivity issue is the availability of the number of levels of indirection. High-level languages usually have only one level of indirection, namely, the use of variables. The design of these languages is such that the user can define a file, assign variable names and then perform operations on those variables. Languages designed in this way usually have system utilities to input and output data, and the user merely defines the names and parameters that apply to the required function.

In contrast, more technical programming languages with multiple levels of indirection allow the programmer to write more symbolic code that accomplishes more functions per line. For example, a programmer might write a single program to handle all of the screen input and output that references a file of file layouts. In a high-level language, this would be provided by the system in a screen definition and data dictionary type of system utility. Obviously, the complexity of programming in the technical environment is greater, but the amount of programming is considerably less. The amount of the difference in the case described here is a 50% increase in the development time.

With each of the systems discussed here, there exists yet a higher level language than the one used. In each case, the application generator translates user parameters into functional equivalents of the programs created at the lower level. The Mumps application generator was not used due to the projected run-time overhead. Adding one more layer on an interpretive language would have greatly slowed production. The RPG generator was not used because of functional limitations.

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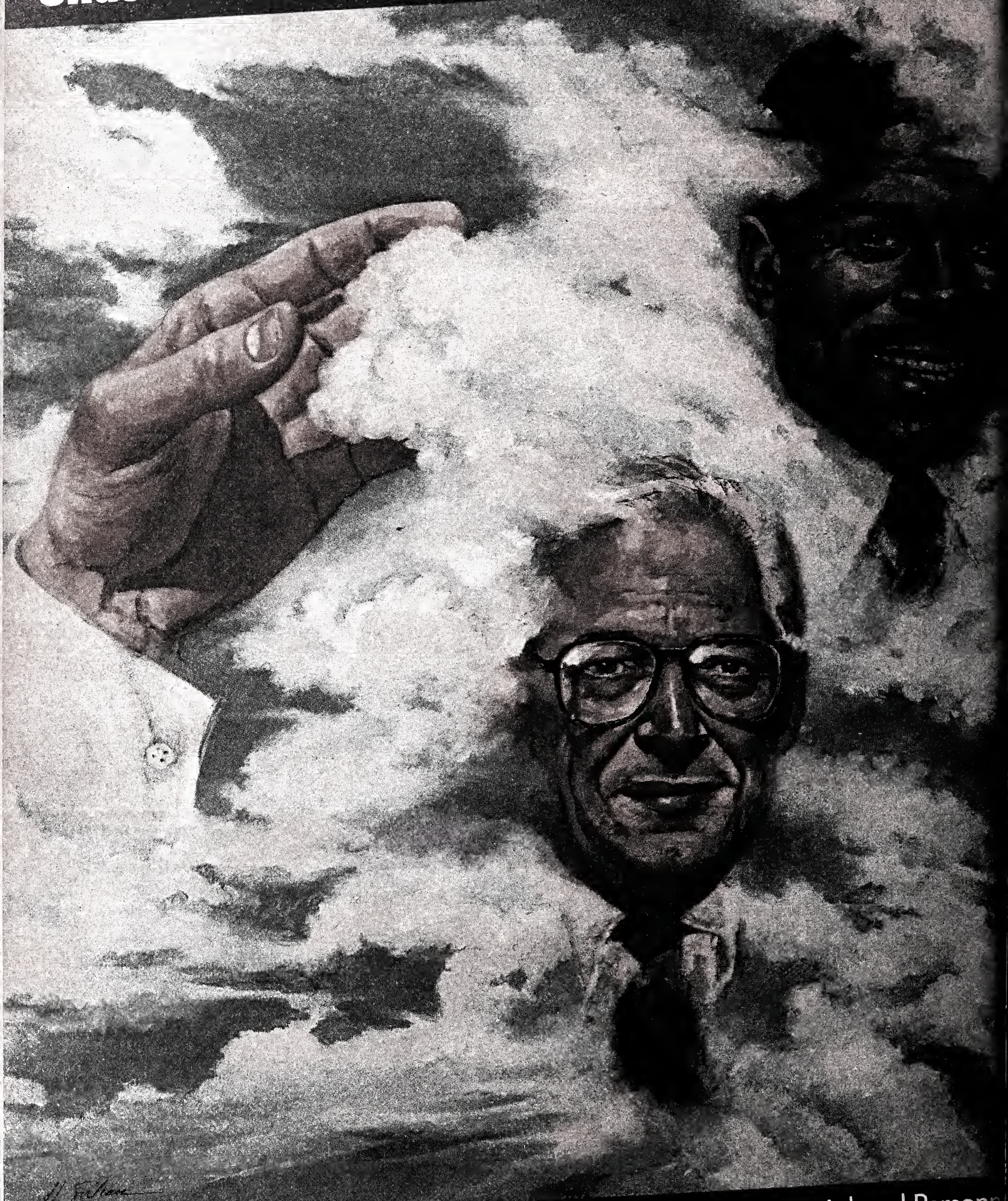

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> *We don't always know in advance what data we'll be collecting. Sometimes we don't even know until the data is transmitted from the test site.* — Tom Galloway, Pratt & Whitney engineering data base administrator

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A broad array of computerized systems is used in the design, manufacture and testing of these engines. And at Pratt & Whitney Aircraft, basic to those systems is a series of software products from Software AG of North America, Inc.

Leading-edge efforts

"Data processing plays an integral part in the entire engineering process for our jet engines," reported Tom Galloway, engineering data base administrator. "The engineering aspects of leading-edge technological efforts would be impossible without computer facilities for computer-aided design and manufacture, development and testing."

More than 2,000 engineering terminal users are supported by three IBM 3081 Model K mainframes with 32M bytes of main memory at the Pratt & Whitney facilities here.

In the engine test area, engines are run on special test stands, with raw data such as temperature, pressure, flow and speeds measured as electrical or mechanical signals, converted to digital counts and floating-point values and then transmitted across a high-speed data link to the waiting mainframes five miles away.

The amount of data generated by this activity can be staggering. "We do almost 50,000 static engine tests a year here in Florida," Galloway said. "Each of those tests has up to 3,200 different engine parameters. And these parameters usually vary from test to test. We also do transient testing, where we take multiple readings of each measured parameter at a rate of 50,000 data samples per second — with tests running for several minutes."

Relational structure

The combination of high volumes of data and the effort required to track it, manage it and make it available to the engineering staff led Pratt & Whitney engineering to look for a data base management system. The choice was Software AG's Adabas, largely because of its relational-like structure and its ability to accommodate on-line changes.

"We're in a fast-moving, volatile development world here," Galloway said. "It's very different from most commercial environments, where you generally know the data fields you'll be working with early in the application development process. Here, it's nothing like that.

"We don't always know in advance what data we'll be collecting. Sometimes we don't even know until the data is transmitted from the test site. We may find out that they're testing an engine configuration today that has never been tested before, and we have to be able to respond to those requirements when we get them.

"That means being able to define data structures easily, without much advance planning and without taking the entire system out of action for everyone else while we're doing it."

In addition to Adabas, Pratt & Whitney is also using Software AG's Natural, Natural/Graphics and Channel-to-Channel Communications systems.

"We hadn't gone out looking for a high-level programming language originally, but we liked what we discovered about Natural," Galloway said.

"We're still handling most of our number crunching in Fortran, but Natural is leading us in new, very positive and productive directions in terms of how we provide DP power.

Sophistication levels

"We support three general levels of DP sophistication here through Adabas and Natural. There are the real nuts-and-bolts types, the seasoned professionals, who could probably do the job with any tools we gave them. There are the users who are willing to do programming, particularly given a high-order language like Natural. And there are the non-DP people, who work best with predefined screens and fill-in-the-blank systems that have been previously set up for their use. Natural and Adabas are allowing us to let each group seek its own level of expertise and get the job done."

Data processing is reaching into more areas than ever before, Galloway noted. "A lot of people in engineering want to do more than just engine test performance analysis. The ability to do on-line query of data on an easy, ad hoc basis is something we could never offer before.

"Natural/Graphics has the same kind of attraction. This package uses high-level Natural statements to interface with IBM's GDDM graphics facility. Once you've located your data with Natural, you simply say DRAW PIE CHART, DRAW BAR GRAPH and so forth. "You don't have to know anything about graphics programming — just what it is you want to see and how you want it displayed.

"All this is leading spontaneously to an information center environment," Galloway said. "We have people coming in and, with only a minimal amount of training, loading in their data, defining their screens and generating their own reports — after our DP staff has defined the data structures to the Adabas data dictionary."

Multiple hosts

With multiple mainframe hosts involved in related activities, Pratt & Whitney is using Software AG's Channel-to-Channel Communications system to provide data sharing among various systems.

"Channel-to-Channel lets users on different hosts access the same physical data base located on one machine at the same time. An Adabas user can be on one mainframe, and the Adabas nucleus actually residing on another — and there can be sets of users on all machines working with the data base. With the amount of data and number crunching we're doing, we could easily bog down a single IBM 3081 if everybody had to use it. This way, we are able to distribute the processing and yet have a centralized data base.

"Another advantage of Channel-to-Channel is that we can run multiple operating systems on the same host, as well as on various hosts, and everyone can communicate with the same data base, regardless of the operating environment."

With Natural and Adabas, Galloway's staff can add new applications quickly while continuing to work on the engine test systems. "Pratt & Whitney is placing increasing emphasis on reducing engine costs in design, development and manufacturing.

"We're now putting together a system to track all of these cost reductions throughout the cycle, from suggestion to review, approval and implementation, along with the estimated dollar amounts. This system will allow our engineers to track thousands of possible engineering changes applying to a cross-section of engines in our product lines. Another possible application is a testing system for RL10 rocket engines.

"Overall, we're experiencing an ability to do more things than ever before — make more data available, support more types of users and activities and provide faster data and analysis turnaround," according to Galloway.

"And what's particularly noteworthy is that we've taken products from Software AG that are primarily designed for commercial DP activity and successfully applied them to the vastly different world of scientific and engineering applications."

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DP development not child's play at Carter's

GRIFFIN, Ga. — Establishing a data processing department to provide information systems for the manufacturing division of a large manufacturing company is no easy undertaking.

The William Carter Co. is not a stranger to data processing; the first computer used by Carter's was acquired in the mid-1950s. Since that first machine, many DP systems that have contributed to the success of the company have been developed and implemented.

Carter's is a large children's apparel manufacturer, in business since 1865, with 6,500 employees and annual sales of $190 million. Carter's is headquartered in Needham, Mass., and has 16 manufacturing locations in Georgia, Texas, Mississippi and Pennsylvania, as well as 12 sales offices located throughout the country.

In 1980, Carter's manufacturing headquarters, located here, 30 miles south of Atlanta, established a DP center to service its manufacturing divisions.

As with the development and implementation of any complex information system, a detailed design of the manufacturing system had to be prepared and approved by top management long before the coding of any application programs could be started.

With the development plan approved, the next task was to evaluate and procure the computer hardware that would service the manufacturing divisions.

Data General Corp. was selected as the computer vendor. Currently, Carter's has a DG M/600 and a DG MV/10000 computer system at the manufacturing headquarters here. Carter's also has eight DG CS/10 computer systems distributed throughout its various manufacturing locations.

The manufacturing computer system operates in a distributed environment, utilizing various methods of communications, which encompass:

- Ten CRT terminals located in the Needham headquarters that are connected to the MV/10000 system here via a dedicated leased line. The 10 terminals utilize a Micom Systems, Inc. data concentrator that allows the connection of up to 16 terminals on one dedicated leased line servicing each terminal at 9,600 bit/sec.
- Remote job entry (RJE) between the MV/10000 system here and the remote CS/10 systems at the various manufacturing locations.
- RJE between the MV/10000 system here and a Honeywell, Inc. DPS 66 mainframe in Needham. This RJE linkup utilizes both a dial-up connection at 4,800 bit/sec and the dedicated leased line at 9,600 bit/sec. By utilizing a switch, the dedicated leased line that services the terminals in Needham during the day is used for RJE communications during off hours.

During the process of evaluating computer hardware, an evaluation of Cobol code generators was also undertaken. After evaluating the packages that were available, Carter's selected System-80 by Phoenix Systems, Inc. of Pittsburgh.

David Bumpus, DP director for manufacturing, was given the task of bringing the manufacturing systems on-line as fast as possible with accurate results.

"With three experienced people on board, using the Cobol code generator enables us to hire personnel just out of college or two-year technical school and sit them down with System-80. Within two weeks, we can have them writing on-line programs," Bumpus said.

At present, Carter's manufacturing DP department consists of eight systems and programming personnel. "We're still developing a lot of new applications utilizing the Cobol code generator. When we first started using System-80, it generated about 70% of the code we needed. . . . We added or changed the rest of it. This is especially true for the on-line applications. I'd say that from October 1980 up through the present, we have over 500 application programs in the manufacturing divisions, of which about 90% are on-line applications. That is quite an accomplishment in a few short years."

Biggest advantage

He went on to say that "the biggest advantage of using System-80 was the short time in which it took to develop on-line applications and batch report applications." Using System-80 forces standardization of data file structures.

But there were problems encountered in the process. The code generator's capabilities did not totally satisfy all needs. One of the initial problems Carter's faced was that the code generator could not generate an on-line application program that would perform calculations or provide totals on selected information. To overcome these problems, the programs had to be modified to meet Carter's needs.

Initial training, the reference manual and a trial-and-error method of learning were all used to provide an understanding of how a code generator worked and to indoctrinate Carter's programmers to the capabilities of System-80. Problems and bugs were reported to Phoenix Systems, which contributed to an enhanced version being used here.

Major systems up and romping

The information systems that were developed and implemented for the manufacturing division cover all areas of the manufacturing process. According to David Bumpus, DP director for manufacturing at the William Carter Co., the major systems that are functional include:

- **Garment specification system.** This is an on-line system that provides manufacturing with a bill of materials for all the individual styles that are to be manufactured for a given season. That number can range from 1,200 to 2,000. This bill of materials contains a detailed breakdown of all the material required to manufacture each garment and the labor hours needed to cut, sew and ship the garment.
- **Inventory control system.** This is an on-line system that provides control of the fabric inventory (approximately 30,000 individual rolls) from the time the fabric is received in the warehouse until it is issued and cut into various sections needed to manufacture the garment.
- **Purchasing system.** This is an on-line system that is utilized for the entry, processing and control of all purchases of fabric and trims required in the manufacturing process. The system provides complete control of each purchase.
- **Production planning system.** This is an on-line system that provides the capability to enter production plans for each manufacturing location for up to 52 weeks into the future by individual style.
- **Material requirements planning.** This is probably the most important system in the manufacturing division in that the information it provides is used to run the manufacturing process at the various mills throughout the country.

The major modules included in this system are:

- Material net availability. This contains the material requirements of all the fabric needed to manufacture the styles according to the plans entered into the production planning system.
- Plans covered by inventory. This contains a breakdown of the production plans that can be issued to manufacturing and can be covered by inventory on hand for the current week.
- Plans not covered by inventory. This is a detailed breakdown of the production plans that cannot be issued to manufacturing for the current week due to the shortage of inventory on hand.
- Production hours planning. This provides a breakdown, for each manufacturing mill and department, of the labor hours that would be required to manufacture the garments.

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Fourth-generation tool powers bank's assets

LOS ANGELES — When Union Bank's Treasury Department set out four years ago to build an asset and liability management system, it was thinking more of spreads and maturities than of fourth-generation languages and programmer productivity.

The spread — the difference between the interest rates on loans and the rates on deposits — is one of the most important factors in bank profitability, especially with the volatile money market conditions of recent years. Asset and liability management in large part consists of matching maturities of bank loans and other assets with those of deposits and other liabilities to maintain a stable and profitable spread.

With $7.7 billion in assets, Union Bank is one of the largest banks in the Southwest. But like many other financial institutions, Union Bank suffered during the late 1970s from asset and liability management that was more an art than a science.

The bank's Treasury Management System (TMS), which makes it possible to compare maturity schedules of groups of assets with groups of liabilities and to monitor interest spreads, has been a key factor in improving Union Bank's profitability. According to William E. Myers, vice-president of finance division systems and the manager responsible for development of the TMS, the key to TMS was Powerhouse, fourth-generation software from Ottawa-based Cognos, Inc. (formerly Quasar Systems Ltd).

"If we'd had to depend on Cobol," Myers said, "we wouldn't have been able to get results fast enough to meet the bank's needs. Powerhouse allowed us to develop the system by using the bank's treasury department financial experts, who understand the investment area, rather than outside programmers."

Union Bank's treasury department is responsible for funding the bank and for going to the securities markets to buy and sell as needed. Improved decision support for treasury operations has had a major impact on bank earnings. During the first year that TMS was operating, the treasury department contributed significantly to the bank's bottom line. Since then, net interest margins have stabilized at a high level, and the bank's 1983 net profits were up 25% over the preceding year.

The TMS uses a Hewlett-Packard Co. HP 3000 minicomputer to track the daily activity of several hundred million dollars in federal funds, Eurodollars, certificates of deposit, commercial paper, fixed rate loans and more than 20 other categories of funding sources. Every afternoon, a daily executive summary report is produced, which shows the maturities and interest rates of major elements of the bank's portfolio. An online chart assists the bank's traders and managers in monitoring cash flow of money market assets.

Controls trading operations

The senior vice-president in charge of asset and liability management relies heavily on the daily TMS report in controlling treasury department trading operations and in making tactical decisions about bank funding. The TMS data base also makes possible sophisticated financial modeling that top management utilizes in setting strategic policy.

Detailed reporting from the TMS data base allows management to assess the performance of various operating units of the bank and helps them keep tabs on the bank's capacity to enter financial markets. By using TMS to analyze certificate of deposit activity and performance by edition, for example, the treasury department was able to define new investment opportunities for the bank.

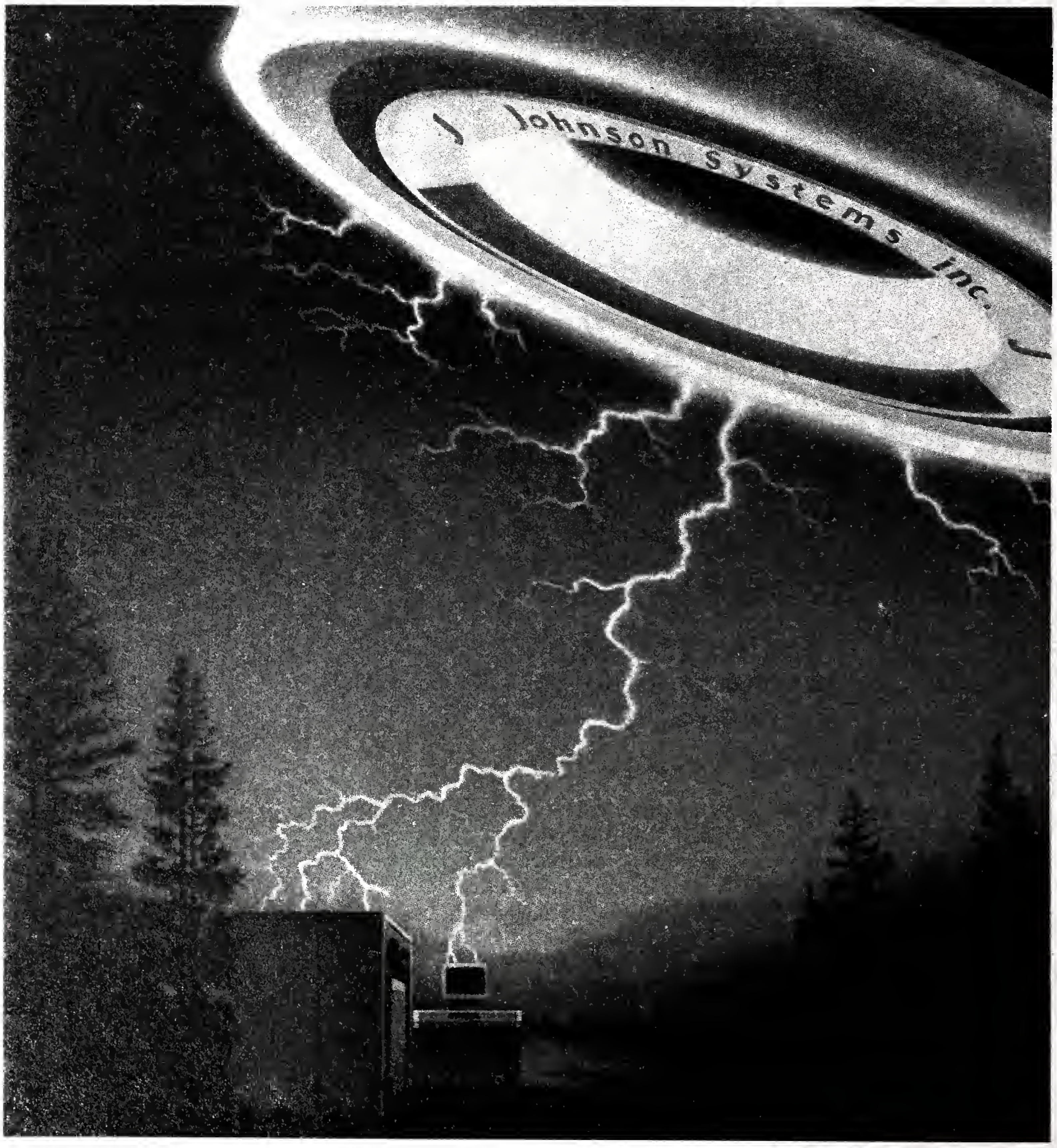
Union Bank's treasury department used applications experts rather than programmers to build systems and integrate existing lower level systems into a fourth-generation environment built with Powerhouse.

First stages

The first stages of Union Bank's TMS project were written in Cobol. Powerhouse was brought in about halfway through the project. Because Powerhouse was designed to work with existing systems, the treasury department was able to incorporate the Cobol programming that had already been done.

Development of the TMS was completed primarily by a treasury department accountant who had no previous programming experience. All enhancements to the system are being written in Powerhouse, and the department plans to replace existing Cobol programs with Powerhouse as new requirements appear.

The TMS changed the way Union Bank runs. "The system pushes the bank's balance sheet into a central computer so that it can be managed daily," Myers said. "It was Powerhouse that gave us the ability to develop, maintain and report from an extract data base containing the most important financial elements over which the bank has control."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Development tool keeps account of bank's code

WALNUT CREEK, Calif. — Crocker Bank's Walnut Creek Operating Center is the heart of Crocker's bankcard operation, which serves nearly 800,000 Visa and Mastercard holders nationally. The center handles all aspects of the operation — from credit application to credit evaluation and granting and embossing of the actual cards to payments, billing, collection, customer service and merchant transactions.

Crocker, with total assets of $23.4 billion and deposits of $18.9 billion, is California's fourth largest bank. In its day-to-day operations, the center makes use of three IBM 4341s — two Group 2s and a single Group 1 — and approximately 600 programs, of which about 83% are written in Cobol.

The Operating Center's manager of systems and programming, Barry Greyling, explained that the center's primary focus at the moment is on maintenance instead of in-house development. Crocker customarily purchases the programs and code that it requires, and Greyling's staff of nine programmers then becomes responsible for maintaining that code. In the performance of that sometimes onerous duty, Greyling relies on a software tool called Extended Productivity Facility/Cobol (XPF/Cobol), produced by Boole & Babbage, Inc. of Sunnyvale, Calif.

"I think," Greyling said, "that XPF/Cobol was designed primarily to be used in development, but we've found it extremely valuable as a maintenance and educational tool."

'Invaluable' tool

"Being able to step through the program and actually watch it execute," explained Keith Couls, Crocker programmer/analyst, "makes XPF invaluable in understanding foreign logic. That's important to us, because we don't write most of the code that we have to maintain. It's normal for problems to arise when you're implementing a new application, and it's often hard to figure out the logic of a purchased program."

Stepping through a program like that, though, can make the product seem slow. As consulting programmer/analyst Mike Pham put it, "If you just want to process 10,000 records, for example, you're going to be sitting there for a long time."

In any case, Greyling, Couls and Pham all admit that even if their release of the product is rather slow to process large programs, it actually saves Crocker's programmers a great deal of time. "Before we got XPF/Cobol," Greyling said, "troubleshooting was a matter of a programmer sitting down at a terminal and devoting as much time as was necessary to finding the problems in a program."

One Crocker programmer had a problem in a program consisting of 40,000 lines of code. "Without XPF," Couls said, "finding a problem in a program that size would have been virtually impossible. But she sat down and found it easily within a day."

"Our job is, basically, to keep the system running," Greyling explained. "That is usually a time-critical responsibility, so we often end up working under tight time constraints."

Greyling concluded, "Probably the greatest benefit we've received from XPF/Cobol is that we can now do quickly what used to take us a lot of time."

That has benefited not only the center's Programming Department, but also its network of more than 400 users hooked directly to the on-line system, according to Couls.

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Program generator an ally in battling backlog

By Dan Pines
Special to CW‡

According to a survey *Computerworld* conducted last year, application backlogs comprise the single most pressing problem facing DP managers. It seems surprising that more than half of the respondents complained of a continuing backlog, considering the increased power of hardware and the plethora of new software on the market.

One solution that has gained momentum is the use of program generators, which allow a programmer to generate source code by selecting items from menus interactively, respond to prompts and paint application layouts directly on the screen.

Usually the generator is used to produce the majority of code. The finished code may include some highly tailored logical procedures, complex data validations and specific screen-handling requirements beyond the capability of any generator.

Program generators are designed to assist programmers, not replace them. As such, they are often confused with application generators, which are strictly end-user products.

Industry gurus predict that as application generators become more sophisticated, they will render the programmer extinct.

Today's users may generate some of their own applications, but sooner or later, an application will require too much tailoring and sophistication to be produced automatically by an application generator.

Procedural languages such as Cobol — which is structured to format, move and manipulate huge quantities of data — have proven to be the most popular way of implementing software solutions to business problems. While these languages can provide the flexibility to accommodate most business applications with minimum system overhead, they have been criticized as being time-consuming to write, modify and maintain.

The real problem with Cobol, however, is not with the language itself, but with its implementations. While there are a few programmers in every DP department who are highly productive, there are many others who write poorly documented, unstructured code. Because of such low-quality work, DP managers see their programmers spending up to 80% of their day maintaining applications that took only a small amount of time to produce.

Program generators provide one way of helping the bulk of average programmers up their productivity. Program generators shine in producing the more routine, mechanistic sections that make up the bulk of any source code.

Speeding programming

Some examples of how program generators can speed up programming are:

■ Rapid prototyping. A working program in the rough may be worth a thousand words of design specifications. With a program generator, a programmer can produce a quick approximation of the finished product, sometimes in a matter of hours.

■ Minimal debugging. The automated process greatly reduces syntax errors and makes logic errors easier to locate and change. For less experienced programmers, this can cut turnaround time substantially.

■ Easier modification of code. Maintenance and modification typically consume over half of a DP department's resources. A program generator can speed up both of these tasks in the same manner as it produces original code.

■ Consistent, well-organized code. Considering the speed with which programmers change jobs, it is becoming increasingly important that any programmer be able to understand the structure of any source code, no matter who wrote it. A good program generator establishes a de facto shop standard to which all participants can adhere.

■ Portability across many systems. The gulf between mainframes, minis and micros is not well bridged. By producing applications in an Ansi standard language, the source code can be ported across many systems and recompiled.

A generator does not replace a programmer; programming is a skill that remains something of an art. It merely automates the repetitious parts. No potter ever suffered from a motorized wheel.

Both types of productivity tools — the user-oriented application generator and the DP-oriented program generator — are strengthening the tenuous links between end users and programmers.

Eventually, an integrated approach may be the answer, with a single software solution serving everyone's ends.

Until then, programmers will use program generators to retain the flexibility of a procedural language and boost their productivity.

Pines is president of Bytel Corp., a developer of software productivity tools based in Berkeley, Calif.

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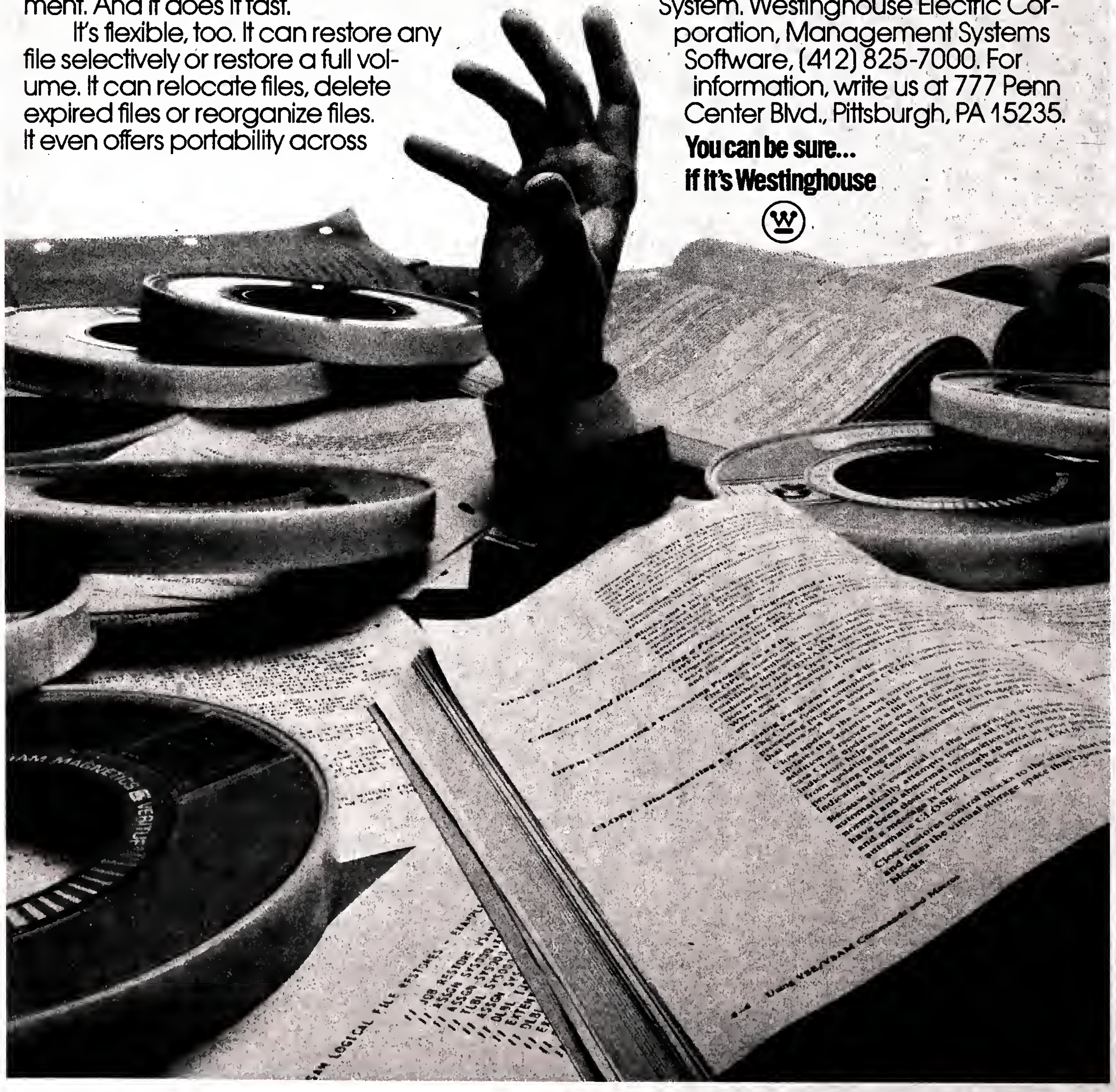

Execs' info system gives quick access

SUNNYVALE, Calif. — The use of an integrated relational data base management system combined with touch screen technology is providing executive management at Verbatim Corp. here with instant access to critical business information.

Verbatim is a leading supplier of removable magnetic storage disks. Fueled by the explosive growth of the microcomputer market, Verbatim experienced a 41% increase in revenues and a 52% increase in profits in the past year.

To satisfy the requirement of keeping track of critical business factors on a timely and regular basis, Richard Diamond, corporate director of MIS, began development of an Executive Information System (EIS). According to Diamond, the EIS had to have the following characteristics:

■ It could not be well-defined before starting.

■ It would be dynamic in use and, therefore, would require a highly flexible design.

■ It would need to be modifiable quickly and at a very low cost.

■ It would need to be very easy to use and results-oriented. Integrated on-line graphics was a must.

First step

The first step was taken in September 1983. Using a methodology developed at MIT and with the help of outside consultants, a series of executive interviews were held to determine Verbatim's critical success factors. These success factors were the key measures that would drive the EIS design.

The EIS had to contain current information on the sales outlook, order backlog and other sometimes subjective data to give senior management a useful tool with which to make decisions, according to Diamond.

Diamond turned to Carl Gallmeyer, manager of executive information systems, whose primary responsibility is to evaluate software tools for Verbatim's Hewlett-Packard Co. HP 3000.

"We looked at a lot of products and realized we needed to prototype the EIS application," Gallmeyer said. "We had to move quickly, get something good and right on-line and not invest too much in getting it done. Of the fourth-generation products evaluated, Relate/3000 from Computer Resources, Inc. [CRI] in Santa Clara, Calif., was the best. I liked the fact that it was one piece of software, and I thought it was well integrated."

Verbatim was one of the first users of Relate's screen-based application development facility, Application Builder. Diamond said, "Senior executives are the end users. The screen interface is a key element in our ability to bring the system up quickly and to have a user-friendly environment."

Approximately a dozen senior executives use HP 150 touch-screen computers to access the EIS. The HP 150 serves two functions: It is a high-resolution graphics terminal, and it puts a microcomputer on each executive's desk.

Because of the need to get on-line quickly, the system had to provide a method for developing the application via a prototyping methodology.

"It was far more important to have the capability to get the application up and in front of the user than to try to design the world's most perfect application," Diamond said.

As executives use the EIS, their suggestions are being used to guide the second phase of development. Verbatim's president, Malcom Northrup, said, "The key is that the EIS is an active system that can be enhanced as we learn more about what we really need."

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READ (FILE-NAME)	EXEC CICS READ DATASET ('FILE-NAME') INTO (FILE-NAME) RIDFLD (KEYNUM) END-EXEC.	READ (FILE-NAME)

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User requests needn't be a pain in the neck

Instead of the cross,
the Albatross
about my neck was hung.
— Samuel Taylor Coleridge
The Rime of the
Ancient Mariner

By James Huling
Special to CW‡

Any analyst who has responsibility for a system with a large backlog can easily feel like Coleridge's Ancient Mariner. In addition to supporting the daily operations of the system, he must carry an albatross of unfinished work requests. Simply organizing the outstanding work can be a monumental task, one that has caused many an analyst to pack his resume and leave.

Application backlogs are a perplexing and growing problem among DPers. Often the analyst faces a large backlog of work, requested months or years ago, that has been passed down to him through several predecessors.

He sees no possibility of ever completing the work, and yet he cannot refuse the assignment. He must either accept the system (and ignore the backlog as long as he can) or leave.

Both alternatives are bad. In leaving, the analyst gives up a job with which he may have been very happy, and he runs the risk of a similar assignment wherever he goes.

In staying and ignoring the backlog, he actually contributes to the problem instead of correcting it. What the analyst needs is another alternative.

The first step toward successfully eliminating an existing backlog is to organize it. Canadian author and educator James Bradley defines management as "the creation and maintenance of useful and productive order." It is order you are after, order that may vary according to the application, but order nevertheless.

Whether you organize by size and complexity or by program function, the key is to find the most logical groupings of the individual requests. By combining them you can often find one solution that will satisfy two or more needs and eliminate any duplication of effort.

Reporting is one example. Consolidating information requested on several reports can save significant amounts of programming time, as well as processing time and paper. Another advantage of organizing the backlog into groups of requests is that it allows you to estimate time and assign priorities to the larger logical units.

Estimating the time and resources needed to complete each group is next. Time estimates are normally made in terms of either elapsed time or actual man-hours.

Using man-hours gives a more precise view of the effort involved and eliminates many vague factors, including emergency support, scheduling delays and computer availability. Be as accurate as possible in your estimates, and avoid the temptation to build in safety margins.

When you have completed the estimates, contact the person requesting the work. Discussing the request offers several benefits.

Benefits

First, you can confirm that the request is still valid and, if not, note any modifications and revise your estimates.

Second, you can let the user know the time and cost involved. An internal chargeback structure is the best means available for communicating the magnitude of systems work.

Reviewing each request and justifying its cost will make assigning priorities easier. Whether you prioritize according to category (for example, problem solution or enhancement) or by the complexity of the work involved, assigning a correct priority is important.

Priorities are clearer when a limited scale is used: for example, 1 to 4, where 1 is work requiring immediate attention, and 4 is work that can be completed as time permits.

With assigned priorities, you can use them and your time estimates to design a schedule.

Keep in mind the timing of peak production periods and allocate more support time for them. Scheduling periodic review points provides the opportunity to monitor your progress and to revise the remainder of the schedule if necessary. Short-term schedules (one to three months) should have at least three review points; medium- and long-term schedules need more.

Management support

The next step, and the most important one, is to gain management support. You will probably be requesting significant resources over an extended period of time. Providing carefully researched estimates and demonstrating the ability to organize and manage the project will be factors in your favor.

The key point in this step is to present the backlog as a single entity. You are seeking approval for one project that, when complete, will eliminate all outstanding work on the system and allow future requests to be handled more quickly. In addition, more time will be available to support the daily operation of the system and to research possible improvements. As a means to this end, the time and cost of the project are well justified.

All that remains is to begin eliminating each request (or group of requests) from the backlog. When you complete an item, notify the person who requested the work. Obtaining his approval assures you that your solution actually meets his needs and keeps him aware of your progress.

When problems arise from the continued daily operation of the system, assign them a priority and work them into the schedule if possible. If they require immediate attention, revise the schedule and notify management of the delay.

One final point: Maintaining a positive mental attitude toward the project will enhance the quality of your work and speed its completion. Consistent, systematic effort will soon eliminate your "albatross."

And from my neck so free the Albatross fell off, and sank like lead into the sea.

Huling is a systems analyst and a project leader with Vulcan Materials Co., a Birmingham, Ala.-based chemical and materials company.

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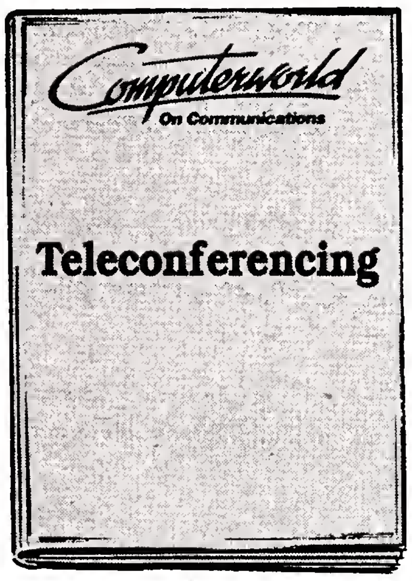

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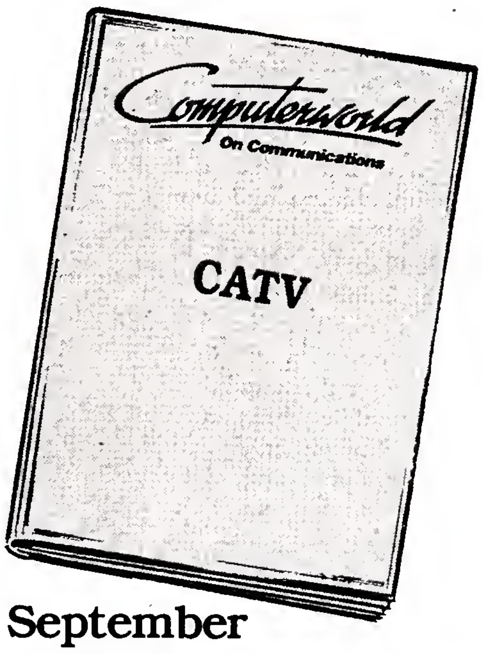

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Alleviating common concerns of application

By Bernard H. Boar
Special to CW‡

One of the most imaginative and successful techniques for improving the productivity of application development is application prototyping. Application prototyping is a strategy for performing requirements definition by building a working model of the ultimate system quickly and in context.

This contrasts with traditional specification techniques such as structured analysis, which attempts to specify in detail all needs prior to any contextual design, implementation or operational experience. The difference is not academic — it is the difference between experience and conjecture.

Despite the intuitive appeal of prototyping as a low-risk way to acquire and validate user-acceptable requirements, a great deal of controversy remains. It is not uncommon to read articles in which various industry experts warn of the dangers of prototyping. If one listened to the critics, one might believe that a strategy of showing an example, receiving feedback and refining the example based on the feedback was imprudent. Yet it is the most common strategy used in numerous disciplines to reduce risk and to confirm ideas before making a substantive investment.

Prototyping is not a perfect approach, nor is it always appropriate. Nevertheless, when properly managed and used, it offers the best strategy for acquiring ultimately acceptable requirements at minimum cost.

■ *Concern* — Prototyping glosses over the real business problems.

Argument — Prototyping jumps much too quickly to building a base solution. It is likely that only superficial and obvious needs will be addressed. Most of the complicated problems will be glossed over. Only a detailed and thorough analysis of the business problem prior to any physical solution can assure that all the problems will be addressed. Prototyping will result in fast but expensive false starts.

Response — The real problem is not whether you may initially miss some needs, but how to discover strategically all the ultimate needs while minimizing project risks. Descriptive and graphical specification tools are fine, but are extremely limited in portraying the actual dynamics of a potential application. Prototyping provides a means first to approximate the real needs; and then through successive refinements, pinpoint them exactly. Even if some needs are glossed over in the early presentations, the process is self-correcting. The contextual testing of the prototype will reveal any functional deficiencies. False starts should be discovered quickly and cost-efficiently.

■ *Concern* — The user will want the prototype as the actual system.

Argument — After a number of iteration cycles, the prototype will appear to the users as a finished system. If they insist on implementing it, the consequence will be an expensive product. Prototyping will introduce a whole new set of political problems into the life cycle. Users will be dissatisfied and disgruntled if they still have to wait a considerable amount of time to get the system.

Response — A prototype is exactly what its name implies — a model. There is no magic. Prototyping provides an illusion. It gives the impression of a finished system, but it is missing many of the attributes of a production application. It is imperative for the prototypers during candidate selection to clarify the limitations of a prototype to the users before starting the project. Nobody insists that descriptive and graphical definition documents be put directly into production.

Similarly, a prototype must first and foremost be viewed as a definition document. Cheating the process will not work. Reality will detect every shortcut taken in attempting to implement the model directly.

Although not directly implementable, the prototype can still help the user during the interim period. If appropriate, it can expedite the design of the actual system by serving as the basis. The prototype can also serve as a training system for the users.

The political problems of dealing with a user who insists on implementing the prototype system is really rather a pleasant change. Most DP managers have to deal with users screaming about how dissatisfied they are with their new system rather than demanding implementation because they are satisfied.

■ *Concern* — Prototyping is a departure from established software engineering practices.

Argument — The body of knowledge developed within the profession over the last few years has focused on rigorous approaches as the best response to development problems.

Boar is an information systems consultant based in East Brunswick, N.J.

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prototyping — the experience difference

Many software engineering principles and techniques are implemented within the organization. Endorsement of a prototyping approach will jeopardize the attempt to make software development an engineering-like process.

Response — Quite the opposite is true. The building of models is the central step of most engineering life cycles.

Most engineering disciplines gave up a long time ago attempting to do it right the first time without building some laboratory throwaways. Introducing prototyping into the development life cycle will for the first time migrate the wisdom of the need for the engineering prototype to software development.

■ *Concern* — Prototyping prejudges a physical solution and will constrain the developers. Prototyping mixes up the "what" problem (logical problem) with the "how" problem (physical solution).

Argument — Prototyping jumps to physical solutions without a careful, logical model of the problem. Logical modeling provides a mechanism for testing various possible solutions before committing to a solution. Keeping requirements definition at a logical level maintains maximum implementation flexibility.

Response — For whose benefit? The idea that anyone other than the logical model creator is thrilled with logical designs is a myth. Users relate best and most naturally to physical examples. When you buy a television, you look at the picture on the screen, not at the wiring schematic.

The physical model can be dissected at the end of the prototype to design exactly many of the system components that logical modeling normally develops.

For example, the necessary logical views of the data base can be predicted exactly by analyzing each screen. The secondary keys that are required can be predicted exactly by analyzing all accesses. Logical guessing can be replaced by physical confirmation.

The users' view of the application is still an external view. There is nothing to prevent the developers from revising data base structures, using a distributed data processing solution or selecting different access strategies. When physical realities require compromises, it will be clear what the before and after are.

■ *Concern* — The iteration process could go on indefinitely. How do you prevent iteration from thrashing?

Argument — Prototyping is a license to change one's mind. Looping could occur indefinitely between demonstration and revision. The process could become extremely drawn out.

After weeks of demonstrations, you might not be closer to an acceptable model than when you started.

Response — Exactly. One of the primary benefits of prototyping is that it serves as a high-visibility safety valve. A project that is going nowhere in prototyping is a project that requires close management attention. If agreement and consensus cannot be reached now, it is better to scrap the project than to pour huge sums of money into an undefinable problem.

■ *Concern* — Prototyping conflicts with data resource administration and the creation of shared data bases.

Argument — Data needs to be treated as an independent resource. The defining, cataloging, stucturing and securing of data should be done independently of the functional applications that use it. The result of such an approach will be the creation of a shared data base resource where multiple applications access the same data.

Prototyping, since it concentrates only on a specific application, will tend to take a tunnel view of the world and conflict with the greater issue of proper data and data base administration.

Response — There is only a possible conflict if a complete development life cycle is not completed and the prototype is rushed into production as an isolated application. During analysis, the current base of data and data bases in which the application must be integrated should certainly be considered. If many of the data elements, records and relationships are already defined, most of the work is already done.

When viewed from a more considered perspective, it appears that the laments of the Cassandras of doom and gloom are without merit. The question facing the DP manager is really quite simple. Why settle for a passive written statement of a user's requirements when you can experience an animated and dynamic model? Why settle? It was different when there was no choice. However, today both the technology and the methodology exist to animate the requirements definition. It is simple common sense that meaningful communication and participation will flourish in an interactive and experimental medium.

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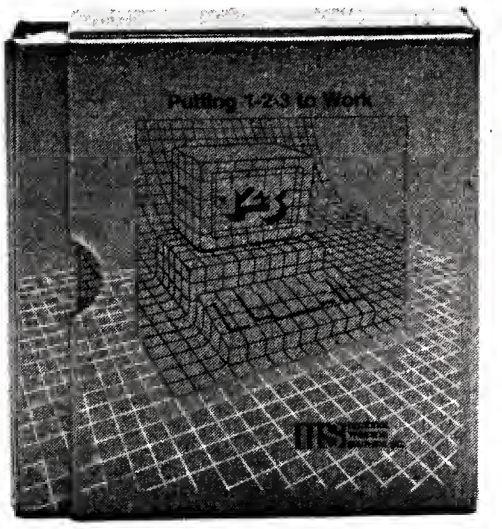

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COMMUNICATIONS

WIRE TAP
Tony Bolton and
Dr. Hank Schultz

Factory needs demand local net

Factory automation has been hindered by the proliferation of noncompatible communications hardware and software within the industrial manufacturing environment. Clearly, the solution to this problem is the establishment of appropriate communications standards that are backed by vendors with cost-effective and compatible data communications products.

At the heart of industrial data communications stands the local-area network. Unfortunately, efforts to standardize local networks have been hampered by the existence of nonstandard network products, advances in technology and an ever-expanding scope of applications.

However, in September 1983, the 802 Committee of the Institute of Electrical and Electronics Engineers (IEEE) approved its 802.4 standard for token-passing broadband and single-channel (baseband) local-area networks. In a related move, the IEEE 802 Committee and the International Electrotechnical Commission's Proway Committee agreed on a common approach for industrial local-area networks, known in the process control industry as process data highways.

This standard, called Proway C, is compatible with the IEEE 802.4 standard. Announcing this standard in November 1983, the groups said "The agreement of a common approach is significant in that it permits a standard local-area network media access technol-

See **IEEE** page 84

Bolton is director of product marketing at Concord Data Systems, Inc. Dr. Schultz is manager of industrial communications systems with General Electric Co.'s automation systems department.

AT&T aims package at BOCs

Gives Centrex users management, OA capabilities

NEW YORK — AT&T Technologies recently announced the Advanced Communications Package, a software package being made available to the divested Bell operating companies that will enable them to offer Centrex customers communication management and office automation capabilities.

At the heart of the new offering is the recently announced AT&T 3B family of minicomputers. With one of the two announced products, the software is loaded into the central office 3B switching computers used to provide Centrex. The second package is meant to run on a 3B installed at the users' site.

The Communications Manager is used by telephone companies at the central office and enables them to offer users a variety of reports on system usage so they can better manage and control the use of their system.

Other service features of the Communications Manager enable customers to make changes in telephone numbers or service from their own premises. A customer message center feature provides Centrex customers with a centralized message system, which provides information such as busy/idle status and enables electronic message distribution, the company reported. A new Centrex Electronic Key function allows a user to activate all Centrex features with a single button rather than a dialing code, the vendor said.

See **AT&T** page 84

INSIDE

Voice/Data Communications/**82**
Multiplexers/Modems/**82**
Network Services/**83**

Prime announces network-related upgrades, plans

By John Dix
CW Staff

NATICK, Mass. — Prime Computer, Inc. fleshed out its communications offerings here last week with enhancements for its major network offering, extended capabilities for its local office network and an announcement of its intent to develop an Ethernet-type local-area network.

Revision 19.3 of Primenet, the company's distributed networking facility, is said to provide for increased network performance, connectivity and management facilities. The software enhancements, which, according to product manager Mitchell Broue, are free to current Primenet users, offer:

- The ability for one node to converse transparently through what Prime called intermediate gateway nodes with remote network systems.
- The capability for each network node to support up to three synchronous lines, one of which can operate at speeds up to

See **PRIME** page 83

MCI cuts over its first fiber-optic, long-distance link

PHILADELPHIA — MCI Telecommunications Corp. recently announced that it has cut over its first long-distance fiber-optic system, a 240-mile link between New York and Washington, D.C.

The optical fiber system more than doubles the long-distance telecommunications capacity between the two East Coast cities, reported Thomas L. Leming, MCI senior vice-president.

The system employs single-mode, as opposed to multimode, optical fibers capable of transmitting voice, data or video information at up to 405M bit/sec. Single-mode is the most advanced optical fiber technology currently available.

According to Leming, the system initially adds 13,000 circuits to the 10,000 terrestrial microwave voice circuits MCI now operates between New York and Washington. The fiber-optic link has a potential capacity of 300,000 circuits.

MCI is also planning to build fiber-optic cable systems along more than 4,000 miles

See **MCI** page 83

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Datatel unit has automatic dial recovery

Datatel, Inc. recently announced the DCP 1040 automatic dial recovery unit, a device that monitors leased-line activity and automatically switches over to dial-up lines when faults are detected.

Used in pairs, one at each end of the telephone link, the units continuously monitor the Carrier Detect or Signal Quality Monitor signals from modems.

When a fault is detected, the DCP 1040 first tests the modems at both ends of the leased line, the vendor said.

If the modems are okay and the fault is isolated as line-related, the devices place two calls over the switched-telephone network, test those dial-up circuits and then switch both modems from the failing leased line to the dial-up lines, according to the vendor.

After the switch-over, the devices continue to monitor the leased line and automatically switch back to that facility when the trouble has been corrected, according to the vendor.

The switching routine may be initiated on command via a standard Electronics Industry Association control signal or manually using a pushbutton on the unit, the company reported.

The units output records of their activity, including information on modem failures, successful switchovers, unsuccessful attempts at establishing back-up lines (reported after three attempts), problem-cleared reports and other system parameters and events, according to a company spokesman.

Audible and visual alarm deterrents are also reportedly provided.

The recovery units may be used with synchronous or asynchronous modems at speeds to 19,200 bit/sec, the vendor said.

They are priced at $1,400.

Datatel is located at Cherry Hill Industrial Center, Pin Oak and Springdale Roads, Cherry Hill, N.J. 08003.

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VOICE/DATA COMMUNICATIONS

NETWORK SWITCHING SYSTEMS, INC.
NSS

Network Switching Systems, Inc. has announced a digital switch that it claims will enable users to combine voice, data and image transmission on terrestrial, satellite, radio, microwave or fiber-optic communications facilities.

The basic NSS switch has an aggregate throughput of 16M bit/sec full duplex and is expandable to a system with an aggregate throughput of 64M bit/sec, the vendor said.

The switch handles channel transmission speeds of 50 bit/sec to 1.544M bit/sec. Other features include network management tools, redundancy, protocol support and accounting.

Prices range from $50,000 to $200,000, depending upon configuration. Units will be available early in 1985.

Network Switching Systems, Three Dundee Park, Andover, Mass. 01810.

MULTIPLEXERS/ MODEMS

PARADYNE CORP.
DCX Bluegate and Xgate

Paradyne Corp. has announced DCX Bluegate and Xgate, enhancements for its DCX multiplexer product line.

The options reportedly allow users to integrate multiple protocols in a common network. Bluegate provides asynchronous-to-3270 bisynchronous protocol conversion integrally to DCX. Each Bluegate card fits into a card slot of a DCX 840/850 chassis and supports up to 32 terminals, the vendor said.

Xgate reportedly provides the packet assembly/disassembly functions required for a workstation to access a public or private packet-switch network. This conforms to X.3, X.28 and X.29 CCITT recommendations. Each Xgate fits into a card slot of a DCX 840/850 chassis and supports up to 64 terminals, a company spokesman said.

Each option is priced at $8,000.

Paradyne, P.O. Box 1347, 8550 Ulmerton Road, Largo, Fla. 33540.

REIF COMMUNICATIONS, INC.
Model 3300

Reif Communications, Inc. has announced the Model 3300 time-division multiplexer.

The product combines seven data channels into a single 56K-byte or 64K-byte trunk and can operate at speeds up to 256K bytes over higher capacity mediums such as microwave. It is available in a rack-mount version that is expandable, enabling up to 26 9,600 bit/sec channels to be accommodated with a 256K-byte link, a company spokesman said.

The 56K bit/sec desktop unit is priced at $1,995 and includes seven channels when used without flow control and six channels with flow control.

Reif Communications, P.O. Box 3051, Wayland Sq., Providence, R.I. 02906.

See MODEM page 83

'Just drop it from a second-floor window onto any would-be intruder!'

MODEM from page 82

MICOM SYSTEMS, INC.
Dialnet 3000 Model 3024

Micom Systems, Inc. has introduced the Dialnet 3000 Model 3024, a 2400 bit/sec full-duplex modem for use over the dial-telephone network.

The CCITT V.22 bis-compatible modem (CCITT's revised standard for modems of this type) can reportedly communicate at 2,400 bit/sec with other V.22 bis modems or, alternatively, at 1,200 bit/sec with Bell Laboratories' 212-type units, a company spokesman said.

Some additional features of the modem include local analog loopbacks; a built-in test-pattern generator; and digital loopback diagnostics. The standard desktop unit is priced at $795.

Micro Systems, 20151 Nordhoff St., Chatsworth, Calif. 91311.

NETWORK SERVICES

COMMUNICATIONS SATELLITE CORP. SOURCE TELECOMPUTING CORP.
Maripress

Maripress, a joint service provided by Communications Satellite Corp. (Comsat) and Source Telecomputing Corp. (STC), will enable passengers aboard ships at sea to receive international news.

The Maripress news digest includes daily dispatches of weather, sports, business and general news. Information is compiled by STC's electronic newsroom throughout the day and evening and is transmitted to a Comsat earth station.

Source Telecomputing, 1616 Anderson Road, McLean, Va. 22102.

HARRIS CORP.
Harriservice

The telecommunications networks division of Harris Corp. has introduced Harriservice, a nationwide program of operation and maintenance support designed for telecommunications networks.

According to the company, the service supports microwave systems, satellite earth stations, mobile radio, fiber optics, video and switching systems with a staff of Federal Communications Commission-licensed field engineers that are on call 24 hours a day, year round.

Some of the service's features include: assured service dispatch time of two hours, end-to-end service and support and centralized dispatching, according to the vendor.

Harris, Telecommunications Networks Division, P.O. Box 1040, Melbourne, Fla. 32901.

MCI from page 81

of right-of-way acquired from Amtrak, CSX Corp. and other railroads. "When completed, sometime around 1987, the optical fiber network will become MCI's primary transmission medium, replacing the present microwave-based network," a company spokeswoman said.

By year's end, MCI will have installed almost 1,000 miles of single-mode optical fiber cable. Short links have already gone into operation in or near Chicago, Los Angeles, New York and San Francisco. Long-haul links slated for completion this year include: Riviera Beach to Miami and Orlando to Tampa, all in Fla.; Mobile, Ala. to New Orleans; Chicago to Cleveland and Chicago to Milwaukee, MCI said.

PRIME from page 81

56K bit/sec.

■ A new capability that enables the Intelligent Communication Subsystem 1 (ICS1) communications controller to support wide-area Primnet links (such as through an X.25-based packet-switched network).

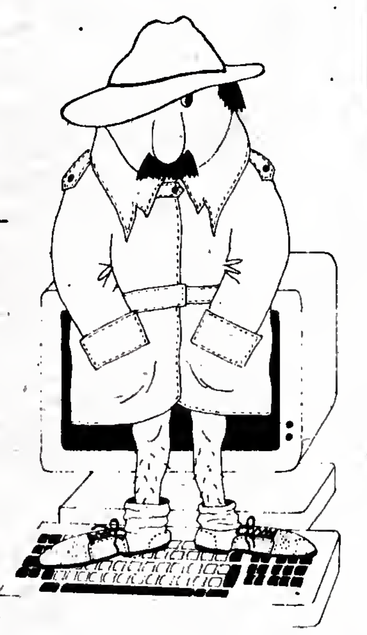
■ The increased number — from 32 to 63 — of remote log-in users supported.

■ A global network configuring capability with editing that is said to enable users to configure an entire network instead of each individual system.

■ The ability to control and modify an existing Primenet network without affecting the Primos operating system.

The company also said that it has conformed to the most recent (1980) X.25 standards of the CCITT while retaining support of the 1976 standard. It announced that its X.25 network products have already been recertified by many of the X.25 packet-switched network carriers,

See PRIME page 84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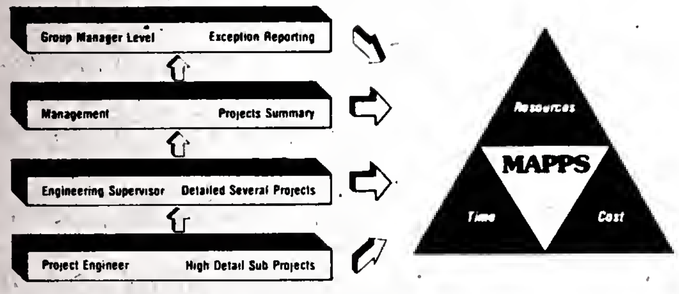

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PRIME from page 83

including Tymnet, Telenet and Uninet.

Some of the Primenet enhancements were realized by extending the capabilities and capacities of Ringnet, the company's token ring network designed to interconnect Prime Series 50 host computers locally.

New utilities

Ringnet enhancements that were bundled into the Primenet upgrade include new utilities that are said to provide a dynamic display of network activity for each node, as well as an increase, from 16 to 128, in the maximum number of Prime hosts that can be accommodated on a single Ringnet.

Additionally, in a separate announcement, Prime introduced the Ringnet Repeater, a device that extends the geographical reach of Ringnet.

Previously, the maximum distance between systems in a Ringnet was 750 feet, but with repeaters, links between network nodes can be extended in 750-foot intervals, according to Prime.

By using fiber-optic cable instead of the usual coaxial cable, distances between network systems or repeaters can range up to 3,280 feet, or one kilometer.

Slated for availability this month, the coaxial version of the repeater costs $3,000, and the fiber-optic version costs $5,000.

Following the route of other minicomputer manufacturers, Prime said that it, too, will announce an Ethernet-type local-area network based on the IEEE's 802.3 international standard, which specifies physical and link-level network protocols.

Prime to conform

The company also stated that it would conform to the layered architecture of the International Standards Organization for the higher level network protocols where compatible with similar draft specifications from the National Bureau of Standards.

"The new [local-area network] will be integrated with Primenet" and enable users "to execute existing applications on the new [local-area network] without changing their software," the company claimed.

Prime is located in the Prime Park, Natick, Mass. 01760.

AT&T from page 81

The Office Manager services, available to customers who choose to have an AT&T 3B computer installed on their premises, are said to provide the full integration of telecommunications system management and general processing. It consists of two modules: the Executive Planning, Information and Communications (Epic); and general processing.

Epic is an office system that utilizes a teleterminal to provide enhanced calling services.

The Advanced Communications Package is scheduled to be made available to the divested Bell operating companies in the third quarter of this year.

AT&T Technologies, 222 Broadway, New York, N.Y. 10038.

IEEE from page 81

ogy throughout an enterprise."

The emergence of a common standard for industrial local-area networks represents a significant step forward for the factory end user wishing to network multiple application devices on a large-scale basis, and for local-area network manufacturers who have targeted this high-growth market segment.

It is important to examine why the Proway committee, network vendors, industrial OEMs and end users have focused on the IEEE 802.4 token-passing bus standard as the preferred solution for factory networking:

■ The advantages of the token-passing access method, combined with broadband cable, particularly benefit the factory. Sophisticated manufacturing techniques, such as those utilizing process control, robotics and computer-aided design and manufacturing, require high-speed, deterministic communications systems with extremely low error rates.

■ Unlike carrier-sense multiple access with collision detection (CSMA/CD) technology, token passing, as defined by the IEEE 802.4 standard, is, under normal operating conditions, a deterministic access technique. This means that network managers can calculate the maximum delay time required for network access under any kind of load and can assign priority levels of access to the network.

■ Token passing is inherently less sensitive to network loading than CSMA/CD techniques, primarily because as the load on a CSMA/CD network increases, so does the occurrence of collisions which can lead to sudden and rapid performance degradation. In addition, token-passing networks are far less sensitive to distance than CSMA/CD networks.

Many factory end users, as well as end users in a DP environment, endorse the use of broadband CATV cable.

In many instances, large facilities already have installed broadband cable systems for applications such as security monitoring and teleconferencing.

CATV is a mature technology and provides for extended distances and large bandwidth to accommodate data, voice and video applications simultaneously. Baseband communications systems are subject to various distance limits. Fiber optics is still an evolving technology but holds promise for the future.

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SYSTEMS & PERIPHERALS

HARD TALK
Tom Henkel
CW Senior Editor

The difficult side of new technology

It's no secret that in order to meet the growing performance demands of users, mainframe vendors are going to have to make updates to aging system architectures. The big challenge, of course, is to make those changes without forcing users into making painful conversions or scrapping existing systems.

That dichotomy has recently raised three interesting situations that exemplify the delicate balance involved in maintaining a peaceful user-vendor relationship.

A year ago, Digital Equipment Corp. outraged users of its Decsystem-10 and Decsystem-20 mainframes when it announced — at a user meeting, no less — that it was scrapping plans to develop a successor to the aging Decsystem line [CW, May 30, 1983]. At the time, many users and industry watchers got the impression DEC was giving users an ultimatum — convert to another processor line (in this case the VAX) — or else.

A year later, DEC announced what appears to be appeasement to those disgruntled Decsystem users — new versions of the Decsystem-10 and 20, which offer 20% more performance than the older versions [CW, May 14]. DEC, while sticking by its commitment to the VAX, also offered three software packages aimed at making it easier for Decsystem users to keep their systems and gradually move over to the VAX line.

Two weeks ago [CW, May 21], IBM made an obvious peace gesture to mainframe users whose systems were made less valuable by newer technology. Back in February [CW, Feb. 27], IBM replaced its 3080 line of processors with newer X models, which use a newer circuit-packaging technique and offer more performance at the same price as the older systems. While IBM certainly did not abandon the users of the non-X models, it did not offer them a field-upgradable migration path to the newer machines either. The result: Many observers expected the residual values of the older non-X model CPUs to drop significantly.

See **PACTS** page 92

Level 62 growth path expanded

Honeywell taps DPS 4 as upgrade option

WALTHAM, Mass. — Honeywell, Inc. last week announced that domestic users of the firm's Level 62 small-scale mainframe processors can now migrate to the firm's DPS 4 processor line.

The upgrade path, which has been available to many users outside of the U.S. since 1980, offers certain Level 62 users an easier growth path to a newer technology processor. Previously, the only migration path available to domestic Level 62 users was to Honeywell's larger DPS 7 mainframe.

A company spokesman explained the DPS 4 was designed to use the firm's Gcos 4 operating system. That operating system is a superset of the Gcos 62 operating system used on the Level 62. The DPS 7 uses the Gcos 64 operating system, which requires users to make a software conversion, the spokesman said.

The DPS 4 migration path is aimed at Level 62 users who have a hard time justifying migration to the more powerful DPS 7. The spokesman said typical users of the DPS 4 processor are companies of less than 100 employees that have annual revenues of approximately $100 million or less. The company added that users who migrate to the DPS 4 still have the option of migration to the DPS 7 at a later date.

The DPS 4 central system incorporates large-scale integration and very large-scale integration technology. It uses a 32-bit bus that connects, in parallel, up to four independently operating processors. The DPS 4 offers a main memory capacity

See **DPS 4** page 90

■ Voicetek Corp. unveils stand-alone, Unix-based voice mail system/**87**

■ Chip design said to cut power requirements of microcomputers and other electronic devices/**87**

INSIDE

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Harris DDP 1600 line gets additions; 16-bit CPUs offer IBM compatibility

By James Connolly
CW Staff

DALLAS — Harris Corp. has announced four entry-level, 16-bit, distributed data processing (DDP) systems featuring IBM compatibility.

The additions to the 1600 DDP line, announced by Harris' Distributed Products Division, are based on 16-bit Harris processors that support 256K bytes of main memory and various peripherals including printers, disk drives and terminals. They support up to 16 workstations and use Harris' Ecos operating system.

According to the company, the systems were designed for the first-time DDP user and allow for upgrades. They support applications such as data entry, word processing, personal computing and interactive Cobol. They offer IBM 3270 and batch communications with IBM Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) and Binary Synchronous Communications (BSC) protocols.

See **DDP** page 90

Kodak targets links with graphics

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — A leading manufacturer of photographic products has begun integrating corporate micros and mainframes in an effort to develop what the company considers the ideal system for creating business graphics.

The ultimate goal of Eastman Kodak Co.'s integration project is to produce an intelligent workstation that will support high-quality graphics packages and transmit charts back and forth between remote users and central mainframes.

Kodak aims to complete the workstation's development by year's end and to begin making the product available solely for internal consumption sometime in 1985, according to the firm's in-house graphics consultant, John Squilla.

Details of Kodak's workstation development plans emerged recently during a program session at the fifth annual conference of the National Computer Graphics Association.

In Kodak's view, Squilla said, the idealized intelligent graphics workstation in-

See **KODAK** page 90

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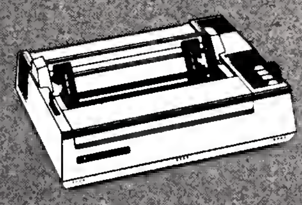

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Unix-based series of stand-alone, voice mail systems out

NEWTON, Mass. — Voicetek Corp. has announced a family of stand-alone, computerized voice mail systems using the Unix operating system.

The VS 700 series supports from 100 to 2,000 users, depending upon the system selected. Message capacities range from 400 to 20,000 messages, or up to 58 hours of messages, according to the vendor.

The systems utilize the C programming language and the Digital Equipment Corp. Professional 350 processor.

The VS 700 is said to let users place, retrieve and forward voice messages, as well as verify delivery. It reportedly allows messages to be placed at any telephone for retrieval at any time, and it also allows users to add their own remarks to received messages before forwarding those messages to other parties.

The VS 700 series can process up to 32 simultaneous voice transactions and features a 10M-byte data and process storage capacity. Each system includes a voice storage subsystem, universal telephone interface, control subsystem, a message management unit, data base disk storage and voice disk storage.

It is designed for use with existing telephone switching systems, including both on-premise private automatic branch exchange systems and off-premise switching equipment.

A typical 1,000-user VS 700 system is priced at $125,000.

Voicetek is located at 61 Chapel St., Newton, Mass. 02195.

GE unveils chip at Electro '84

BOSTON — General Electric Co. recently introduced a chip which it said may reduce the size and power requirements of personal computers and other electronic products.

Announced at the Electro '84 conference here, the chip is said to supply the interface between the line voltage and the low voltage used by microprocessors. It can reportedly operate at voltages as high as 500 ac, converting line voltage to the requirements of the microprocessor. Currently, such a function is carried out by a circuit board containing discrete devices, logic relay circuitry and relays. Such a board can measure 1½ by 3½ in. The GE chip can sit on a fingertip.

Available in September, the chip reportedly can be used in printers and in plasma displays.

The unit requires 15% to 25% less power than current circuit boards providing the same function, GE said from 3135 Easton Tnpk., Fairfield, Conn. 06430.

DATA STORAGE

SYSTECH CORP.
Model HTC-4000

Systech Corp. has introduced a ½-in. magnetic tape controller, Model HTC-4000, which interfaces industry-standard ½-in. magnetic tape units, microstreamers and cache tape systems to the Intel Corp. Multibus.

The HTC-4000 controls up to eight drive units with running speeds of 12.5 in./sec to 125 in./sec and supports tape densities of 800 bit/in. NRZI; 1,600 bit/in. phase encoded; 3,200 bit/in. phase encoded, or 6,250 bit/in. group code recording at 50 in./sec.

The controller features high-speed direct memory access transfers over the full Intel Corp. Multibus-compatible 24-bit addressing range without 64K-byte ad-

Continued on page 88

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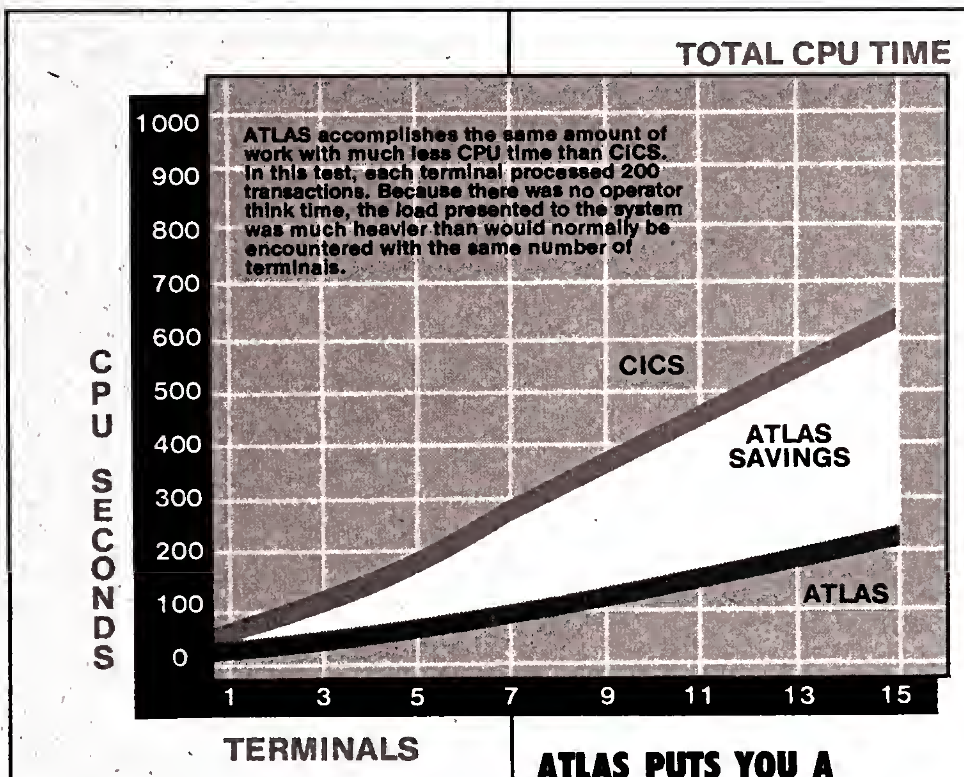
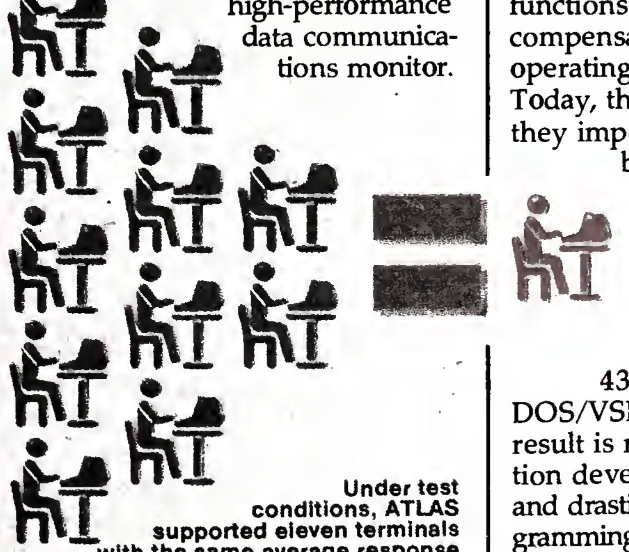


ATLAS accomplishes the same amount of work with much less CPU time than CICS. In this test, each terminal processed 200 transactions. Because there was no operator think time, the load presented to the system was much heavier than would normally be encountered with the same number of terminals.

With the same combination of innovative technology and practical features that has made RAMIS II the leading fourth-generation language, Mathematica introduces ATLAS: a new high-performance data communications monitor.



Under test conditions, ATLAS supported eleven terminals with the same average response time as a single terminal under CICS.

CICS/VS is a registered trademark of International Business Machines Corp.

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ATLAS inaugurates a whole new generation in data communications software. Because CICS and other traditional monitors were initially developed in the late 1960s and early 1970s, they incorporated functions like "pseudo-tasking" to compensate for deficiencies in the operating systems then in use. Today, those functions remain and they impose layers of overhead to burden your computer—unless you use ATLAS. Designed for the 1980s and beyond, ATLAS is the first monitor to truly unlock the power of IBM's 4300 series computers and DOS/VSE operating system. The result is more productive application development, high reliability, and drastically reduced systems programming demands. But most of all, dramatically improved performance.

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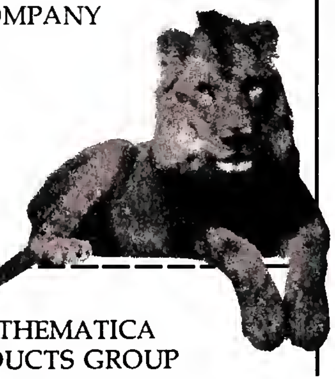

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Continued from page 87

dress boundary restrictions. The HTC-4000 is compatible with any drive that complies with the industry-standard formatted Pertec Computer Corp. interface.

To speed implementation on site, the controller is supplied with a Unix driver, the vendor said.

The price of the controller is $1,195.

Systech, 6465 Nancy Ridge Drive, San Diego, Calif. 92121.

TERMINALS

DECISION DATA COMPUTER CORP.
3761

Decision Data Computer Corp. has unveiled a CRT workstation said to be compatible with IBM System/34, 36 and 38 computers.

Among the features are a 14-in., tilt-and-swivel display, an adjustable keyboard and a six-ft, detachable coiled cable from the keyboard to the monitor. The unit also has a green-phosphor screen with a 24-line by 80-char. display.

It also has work-pad memory, which allows the user to store a full screen of information in the workstation. This reportedly enables the user to scroll through data and manipulate it from one screen to another.

The 3761 costs $4,077.

Decision Data Computer, 100 Witmer Road, Horsham, Pa. 19044.

FALCO DATA PRODUCTS, INC.
TS-2624B

Falco Data Products, Inc. has announced the TS-2624B data entry terminal, an emulation of the Hewlett-Packard Co. 2624B.

The terminal can display 24 lines by 80 col. or 132 col., according to the vendor. Features include reverse video, half-bright, underline and blank fields. For reducing traffic between the user and host systems, the TS-2624B has block-edit and alternate-mode features.

The terminal's cache memory of 31 blocks of 256 bytes (the same as the HP terminal) allows users to program without accessing the host. A security feature allows checking for illegal data.

The standard screen is a 12-in., green P31 phosphor screen. Standard ports are two RS-232Cs; RS-422 or current loops are optional. Transmission rates range from 50 bit/sec to 9,600 bit/sec, the vendor said.

A TS-212 Plus modem operating at either 1,200 bit/sec or 300 bit/sec is another option.

Falco Data Products, 1286 Lawrence Station Road, Sunnyvale, Calif. 94089.

PRINTERS/ PLOTTERS

VERTICOM, INC.
Diablo Series C printer

Verticom, Inc. has announced that it is adapting Diablo Systems, Inc. Series C ink-jet printers for use with Verticom's PLP100 and PLP200 color graphics terminals.

Verticom is reselling the printers after adding firmware.

The printer reportedly works in two modes, one for printing Ascii characters and one for printing bit-mapped graphics. Verticom said that the 4,096 colors usable on the terminals are reproduced on the printer in graphics printing mode with twice the resolution of the Verticom terminal.

Text characters printed in character mode reportedly use a 12- by 16-dot matrix.

The Diablo printer is designed to print on transparencies, as well as on paper. Printing is controlled from the Verticom keyboard. The user reportedly can print one graphics page while working on another.

The printer, intended for marketing to OEMs and large end users, costs $2,200.

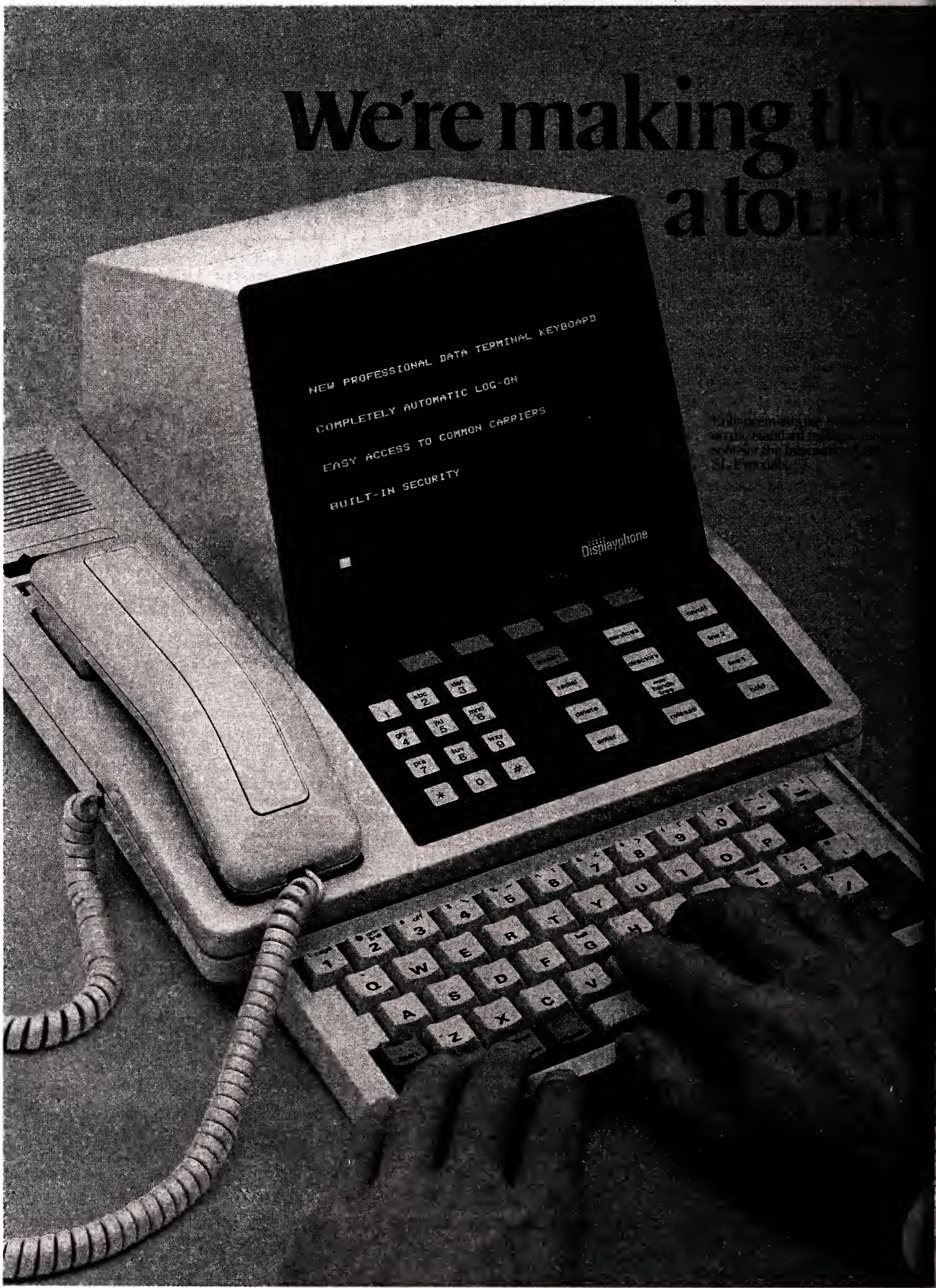
Verticom, 545 Weddell Drive, Sunnyvale, Calif. 94089.

GRAPHICS SYSTEMS

WESTWARD TECHNOLOGY, INC.
3219W; 3220W

Westward Technology, Inc. has announced two graphics workstations.

The 3219W monochrome workstation is said to feature a noninterlaced screen with a 2,048- by 1,568-pixel resolu-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tion and a picture that is redrawn almost 60 times per second. It also reportedly features a drawing speed of up to 380 nsec per pixel in vector mode.

According to the vendor, the 3219W produces a flicker-free picture. An optional second memory plane reportedly allows users to further improve the picture with Westward's line-smoothing technique (antialiasing).

The 3220W color workstation features Westward's custom very large-scale integration design. It is said to have four bit planes with up to 16 colors displayable from a palette of 4,096 colors. It is also available in an eight-plane version offering 256 colors from a palette of 16 million.

The vendor said that the ability to define subtle color differences means the 3220W is suitable for demanding applications such as cartography and three-dimensional solid modeling.

The 3219W costs $14,950, and the 3220W costs $15,450.

Westward, 90 Montvale Ave., Stoneham, Mass. 02180.

ADVANCED ELECTRONICS DESIGN, INC.

Colorware System 23

Advanced Electronics Design, Inc. has introduced a line of color graphics workstations, the Colorware System 23, for Digital Equipment Corp.-compatible independent sales organizations and systems integrators, the vendor said.

The products reportedly provide interactive processing capabilities, full-color display and local data storage for applications such as computer-aided design.

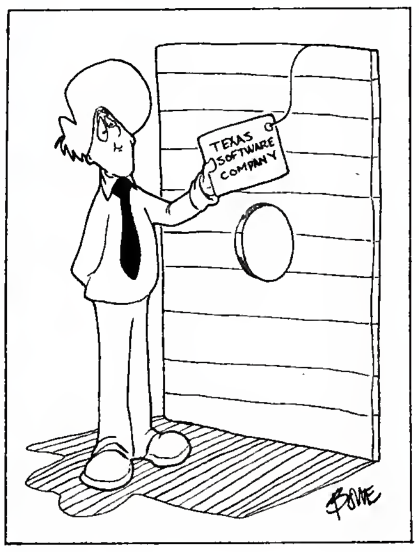
The Colorware System 23 is available in three models, the 23/10, the 23/7 and the 23/5, according to a vendor spokesman.

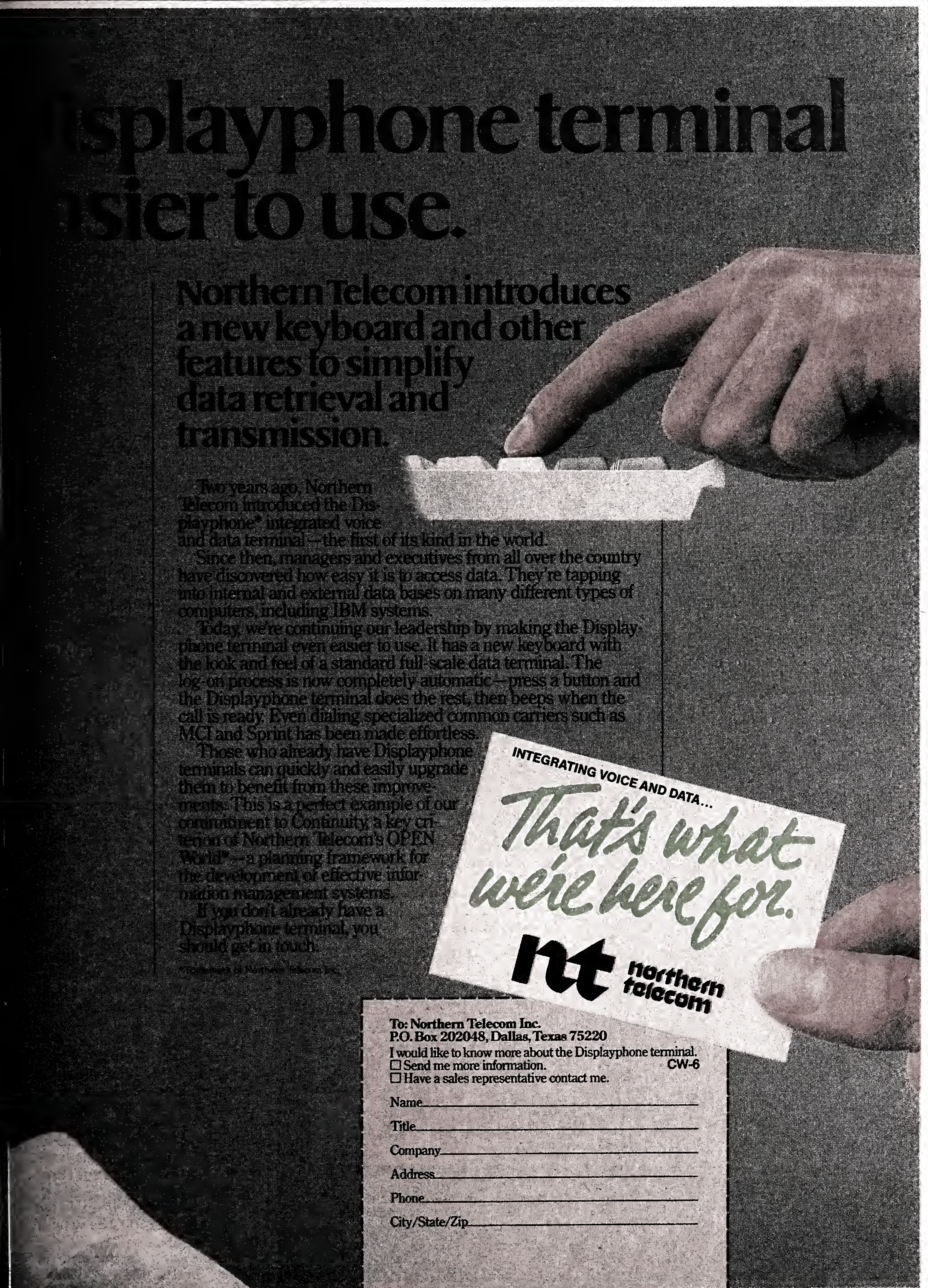
It reportedly offers local processing capability with the capacity to view information at resolutions of 1024 by 768 pixels, 768 by 575 pixels or 512 by 512 pixels on a 19-in. color monitor. Each model can display 256 colors simultaneously, from a palette of 16.7 million, according to the vendor.

Other features reportedly include firmware antialiasing on the 23/10 and 23/7, command protocol of over 90 commands and polygon fills. Independent manipulation of the eight video memory planes, using read-write masking, is said to permit users to develop color overlays.

The model 23/10 workstation is priced at $28,500, the 23/7 at $24,000 and the 23/5 at $21,500, according to the vendor.

Advanced Electronics Design, 440 Potrero Ave., Sunnyvale, Calif. 94086.





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KODAK

from page 85

corporates three key elements — a library of highly capable software packages, IBM 3279 color terminal emulation and the ability to upload and download files to and from host processors.

Using these three prerequisites as a guide, the company recently selected 10 graphics software packages for potential inclusion in the planned workstation and evaluated their performance according to various criteria. All 10 programs operate with IBM's Personal Computer.

After ascertaining which of the prospective packages provides the best features, Kodak intends to combine the software with the organization's in-house IBM Personal Computers. Also slated for addition to the Personal Computers will be a 3279 emulation capability and a micro-to-mainframe link, which will support both uploading and downloading.

Kodak's efforts to develop its own intelligent graphics workstation highlight a question that the business world is increasingly having to address: Which is the better vehicle for generating charts — mainframes or micros?

The answer is that both alternatives have their virtues and trade-offs. Mainframes offer the advantages of large amounts of graphics power and huge data bases, but are expensive to use and are seldom readily accessible. Personal computers, on the other hand, lack many of the powerful capabilities of much bigger systems, but compensate for the deficiency with their superior responsiveness and friendly user interface, Squilla said.

Neither micros nor mainframes are universally effective as graphics tools.

So the only way for users to devise a comprehensive solution to their graphics problems is to marry personal computers and mainframes and obtain the best of both worlds. That integrated approach to meeting business graphics needs is mirrored in Kodak's ongoing efforts to develop an intelligent workstation that unites the company's micros and host processors, Squilla said.

DDP

from page 85

System 1 of the series was designed to provide concurrent data entry, word processing, personal computing and remote job entry functions. It is said to support up to eight workstations, system and workstation printers and any one of several communications interfaces. System 2 was designed for DDP applications requiring magnetic tape backup and fixed-disk storage. It includes a 40M-byte Windsor fixed disk and a 1,600 bit/in., 9-track streamer tape unit with start/stop and streaming modes.

System 3 is said to feature the capabilities of System 1 plus IBM 3270 communications. Supporting eight terminals, it is said to switch from DDP mode to 3270 mode with a keystroke.

System 4 includes all of the functions of the first three systems and supports up to 16 workstations, according to Harris. It is said to provide batch and 3270 communications in BSC or SNA.

Prices vary according to the configuration ordered. A typical System 3 configuration is priced at $83,373.The systems are available now.

Harris, 16001 Dallas Pkwy., Dallas, Texas 75240.

DPS 4

from page 85

ranging from 512K bytes to 8M bytes, the firm said.

The DPS 4 is available to domestic Level 62 users on a purchase-only basis and will be available in September. A typical DPS 4 configuration costs $71,340. Some users who migrate to the DPS 4 will be able to keep the same mass storage devices, communications terminals and system console used on the Level 62, Honeywell said.

Central system expansion costs $5,000 for each 512K-byte memory increment. A second instruction processor costs $30,065, and a second disk processor costs $17,542. Network control processors cost $8,399 each, Honeywell said, and a maximum of three can be used.

The monthly license fee for Gcos 4 is $400, the vendor said.

Honeywell is located at 200 Smith St., Waltham, Mass. 02154.

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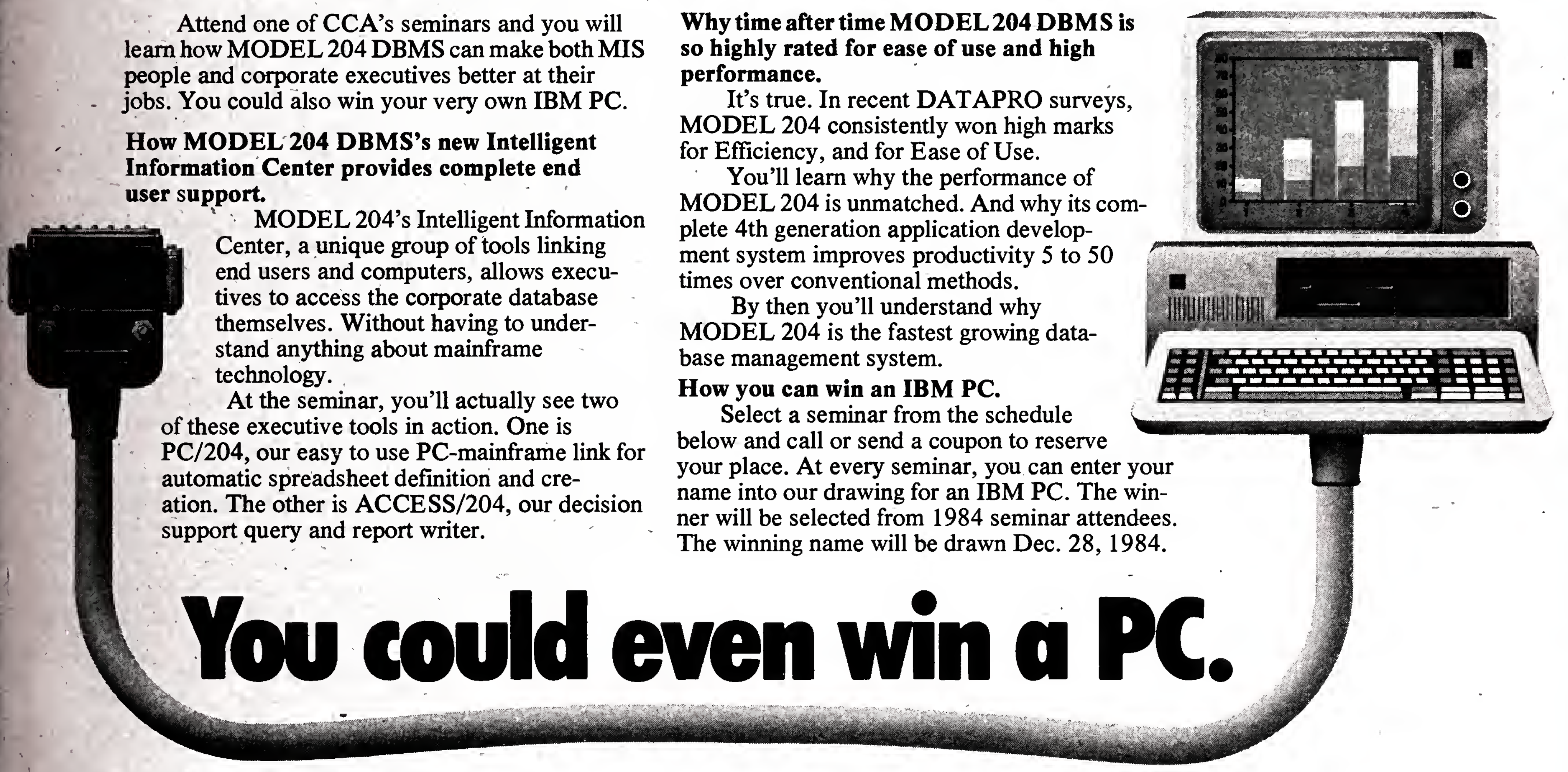

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PACTS

from page 85

When IBM announced the X models, it undoubtedly knew users would be upset. To quell that anger, the firm cut the model-to-model upgrade prices for the older systems and slashed maintenance prices to meet those offered on the newer CPUs. But those actions still left some users out in the cold. For example, users of the 3081 Model K processors did not have much of an upgrade path.

They could buy another CPU and convert their systems to a 3084 complex, but many of the users were not willing to make such an expensive upgrade.

So, two weeks ago, IBM announced a relatively inexpensive ($16,000) performance upgrade kit that offers users of non-X models the chance to add a little extra performance (roughly 6%). That extra performance may be just enough to tide some users over until IBM unveils its rumored Sierra line of mainframes later this year.

While IBM and DEC suprised users with unpopular news, Control Data Corp. took the opposite approach. When it announced the newer technology Cyber 180 series of mainframes [CW, April 30], the firm told users of the Cyber 170 Model 835, 845 and 855 systems that they had a spare instruction set hidden in their systems that would allow them to run a new version of the CDC NOS operating system called NOS/VE.

Some confusion

While this approach seems to beat dumping bad news on users, it also may wind up causing some confusion.

For example, when users bring up NOS/VE on the Cyber 170 835, 845 or 855, do they then own Cyber 180 machines, or do they still have older Cyber 170 machines?

It is clear that switching to new system architectures may not always be a painless process: It is very difficult to develop a truly new product and still make it totally compatible with older systems. Progress sometimes hurts; but the results ultimately benefit the user community as a whole.

But the fact that some users wind up suffering more than others is a problem. Vendors must realize that introducing new systems takes just as much political savvy with the user community as it takes technical wizardry in the laboratory.

Users in the lurch

Of the three recent cases, DEC appears to have done the worst job of playing the political game. Both users and industry watchers alike got the impression DEC left its Decsystem users in the lurch. DEC says its intentions were misunderstood — it always planned on providing additional support to Decsystem users, the products were just not ready until early May.

IBM, which in the past has tread on thin ice with its users, at least managed to soften the blow to non-X model users with price cuts and performance increases. In fact, some industry watchers contend some of the non-X models are now better deals than the newer systems.

CDC's suprise attack technique is certainly unique. It indicates CDC was thinking about its current user base when it developed the Cyber 180 line. But the firm may find itself going through a phase where some users are not quite sure whether they own an old-technology processor that has been retrofitted with a new operating system or a new-technology processor that was originally disguised as an old-technology processor.

These three cases are just the beginning. As more vendors depart from their mainstay mainframe architectures, there will be more upset users. But there will also be better processors. It is an inevitable tradeoff that as newer technologies are incorporated into computer systems, there will be more cases of incompatiblilty with existing systems. Some users will just have to grin and bear the inconvenience caused by incompatibility. But some will surely grin less often than others.

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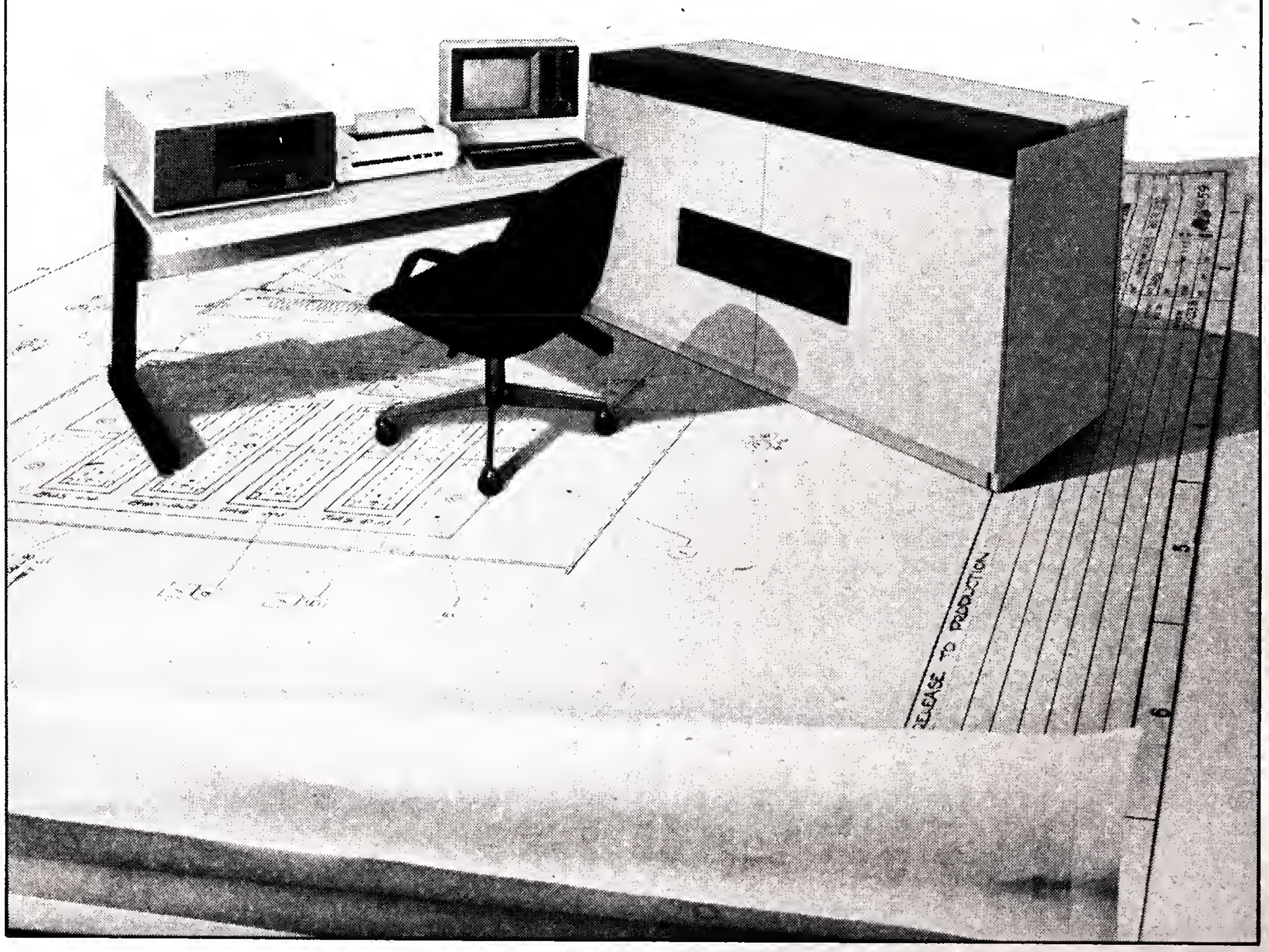

MICROCOMPUTERS

MICRO BITS
Paul Korzeniowski
Staff Writer

Many micro terms remain undefined

Integrated, compatibility, portable, supermicrocomputer, user-friendly, artificial intelligence . . . What do these terms mean? Ask two vendors, receive two antithetical answers. Ask two users, and they shrug their shoulders.

Historically, technical advancements in the computer industry have clouded distinct product categories. With the advent of personal computers, many product definitions have been reduced to meaningless buzzwords.

With hundreds of hardware companies and thousands of software companies peddling products, vendors have difficulty determining how to market their offerings. The easy approach is me-too marketing: finding the best-selling software package or microcomputer and then asserting that your product is just like the best-seller.

Soon after Lotus Development Corp. reached the top of many software sales lists with the 1-2-3 integrated package, other software vendors began advertising that their products were also integrated. Some product lines featured similar command structures for various applications; other packages were able to share data disks created by distinct applications.

But unlike 1-2-3, many packages were not able to load various applications into random-access memory, did not provide a central data file and did not allow users to switch from one program to another with a single keystroke. Despite the lack of these capabilities, other companies kept stating that their products were integrated.

'IBM-compatible'

Similar misconceptions occurred with hardware. As the IBM Personal Computer's sales increased, so did the number of "IBM-compatible" microcomputers.

Many compatibles merely ran Microsoft, Inc.'s MS-DOS operating system and were unable to run software that made IBM Personal Computer hardware calls. In some cases, compatibility was physically impossible. In one case, ACT Ltd. maintained that its Apricot microcomputer was IBM-compatible, even though the Apricot possesses 3½-in. disk drives and the IBM micro has 5¼-in. disk drives.

While some manufacturers try to mimic best-selling products, others coin new terms to differentiate their products. Although most people understand the difference between a Radio Shack Model 100 and a Compaq Computer Corp. Compaq, many have difficulty determining the difference between portable and transportable.

When Kaypro, Inc. initially announced its line of microcomputers, David Kay, marketing vice-president, chose a television set analogy to define portable. If one could easily pick up the computer and plug it into an electrical outlet

See **TERMS** page 99

Otrona unveils portable micro

IBM-compatible system converts to desktop

Otrona's 2001

BOULDER, Colo. — A 19-lb portable microcomputer that converts within seconds to a desktop system and is said to be 100% IBM-compatible was introduced this month by Otrona Advanced Systems Corp.

Otrona has targeted the new system toward Fortune 1,000 firms, government organizations, scientific/engineering groups and other users needing a portable system, Otrona President James Lindner said.

The new Otrona 2001, selling for $2,495, features an Intel Corp. 8088 processor; 128K bytes of random-access memory (RAM); a 7-in., flat-screen amber display; a 360K-byte floppy disk drive; an RS-232 port and a parallel port; and a composite/red-green-blue external monitor interface, according to Otrona.

Expansion options are said to include a second floppy disk drive; a fully portable 10M-byte internal hard disk; additional memory up to 640K bytes of RAM; a Zilog, Inc. Z80B processor and Digital Research, Inc.'s CP/M operating system; an Intel 8087 coprocessor; a 300/1,200 bit/sec internal modem; a real-time clock; a graphics board; additional asynchronous and synchronous ports; and an internal dc power option.

Users can convert System 2001 from a portable to a desktop setup by removing the 7-in. display (which requires no tools) and adding either a 13-in. color or a 12-in. monochrome display, the company said.

Otrona claimed that the 2001 runs all IBM software off the shelf. The system accepts up to three IBM-compatible boards, the company added.

The 2001 is immediately available, Otrona said.

The firm also announced that ship-

See **2001** page 99

IBM Personal Computer Assistant series shares data files among applications

BOCA RATON, Fla. — IBM has announced the IBM Personal Computer Assistant series, a collection of integratable application programs that run on the IBM Personal Computer, Personal Computer XT, Portable Personal Computer and PCjr.

Software Publishing Corp. in Mountain View, Calif., creators of the PFS software line, wrote the programs. "The writing, filing, reporting and graphing programs are enhanced versions of current PFS series programs," said Rick Scott, an IBM spokesman. Data files can be shared among different applications, IBM said.

The Assistant series consists of Writing Assistant, Filing Assistant, Reporting Assistant, Graphing Assistant, Planning Assistant, Executive Solutions, Accounting Solutions and Home Solutions.

Writing Assistant, which costs $149, includes a 125,000-word spelling checker, IBM said. Filing Assistant, also available for $149, reportedly allows a user to link distinct data bases. Reporting Assistant is said to feature ascending and descending sort capabilities and use of the Enter key rather than the F10 key. It costs $129. Graphing Assistant, selling for $149, reportedly produces bar or pie graphs. Planning Assistant, available for $149, permits users to create a spreadsheet with an unlimited number of rows and columns, according to the vendor.

Executive Solutions, Accounting Solutions and Home Solutions are three tem-

See **ASSIST** page 99

Molecular offers multiuser system

SAN JOSE, Calif. — Molecular Computer has introduced the Series 9, a multiuser, multiprocessor system capable of running Digital Research, Inc.'s CP/M 80, MP/M 80, and MP/M 86 and Microsoft, Inc.'s MS-DOS operating systems.

The system is based on Molecular's N/star network operating system, which is said to provide file-sharing and interprocessor communications capabilities.

Series 9 reportedly supports nine processor cards, which can serve as user processors, dedicated spool queue processors, tape backup processors, clustered communications controllers and electronic mail gateways.

The processor cards come in two configurations, Molecular said. AP/186 features an Intel Corp. 8086 microprocessor and 256K bytes of random-access memory (RAM) and can run CP/M 86, MP/M 86 and MS-DOS applications. AP/80X consists of a Zilog, Inc. Z80A microprocessor, 64K bytes of RAM and two RS-232 serial ports. This 8-bit card can run CP/M 80 and MP/M 80 software, according to the vendor. The cards are connected to Molecular's M/bus, a interprocessor link said to operate at a speed of 400K byte/sec.

The central system has a Zilog Z80B microprocessor, 128K bytes of RAM, 20M to 40M bytes of hard disk storage, a 360K-byte floppy disk drive and optional printer and tape backup units.

Dumb terminals can be connected to the firm's Terminal Concentrator Processor (TCP), an eight-port multiplexer that includes an AP/186 microprocessor and 256K bytes of RAM.

A Series 9 system with a 20M-byte hard disk costs $7,995; a 40M-byte hard disk system sells for $9,995. The AP/186 lists for $1,695, and the AP/80X costs $995. TCP sells for $1,995.

Molecular Computing is located at 251 River Oaks Pkwy., San Jose, Calif. 95134.

■ Visicorp drops prices for its Vision integrated package — again/**94**

■ Franklin Computer Corp. introduces a line of Apple Computer, Inc. Apple IIe-compatible machines/**94**

■ A package from Digital Research, Inc. converts the IBM Personal Computer to a four-user system/**96**

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Franklin brings Apple II-compatible portables to mart

NEW YORK — Franklin Computer Corp. earlier this month brought to market its second wave of microcomputer products, a line of transportable microcomputers compatible with Apple Computer, Inc.'s Apple II, but based on a proprietary operating system.

Ranging in price from $1,400 to $2,300, the CX series of 25-lb microcomputers ranges from a system with 64K bytes of random-access memory and one disk drive to a 128K-byte machine. The machines are capable of running programs written for Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s CP/M 2.2 operating systems, as well as F-DOS, the Apple II-compatible operating system offered by Franklin.

The top-of-the-line CX-2M is reportedly fitted with a disk controller, enabling it to transport data files from disks formatted for IBM Personal Computers and compatibles as well as Kaypro, Inc. and Osborne Computer Corp. machines. With this controller, the CX-2M will be available for $2,300.

The four machines in the CX line are fully compatible with the Apple II+ only. The product line also includes:

■ The $1,400 CX-1, which comes with one disk drive and 64K bytes of memory. It is available now.

■ The two-drive CX-2. Priced at $1,700, it will be shipped in June.

■ The $2,000 CX-2C, with 128K bytes of memory, two disk drives and a CP/M card. It will be available for $2,000 in August.

All four CX models are fitted with a 7-in. monitor and detachable keyboard, Franklin said. Each system comes with a free diskette containing word processing and financial spreadsheet packages. The two models equipped with a CP/M card are accompanied by a free issue of Micropro International Corp.'s Wordstar software.

Franklin is located at 1070 Busch Memorial Highway, Pennsauken, N.J. 08110.

Visicorp Vision tools prices cut

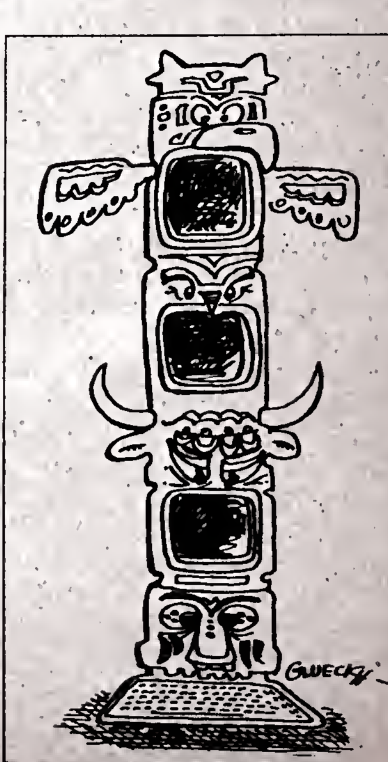
SAN JOSE, Calif. — Visicorp is offering a package of its Vision integrated productivity products for $795 during a promotion ending June 30, the company said in mid-May.

The bundle features the Vision applications manager, Vision Calc, Vision Graph, Vision Word and the company's mouse input device, Visicorp said.

When Vision first shipped at year-end, this package was priced at $1,765. Visicorp cut the price of the applications manager in January. The new bundle pricing represents a further $515 drop from suggested retail prices, the company said.

Vision runs on the IBM Personal Computer XT and compatible machines equipped with hard disk drives, the company noted.

Visicorp is located at 2895 Zanker Road, San Jose, Calif. 95134.



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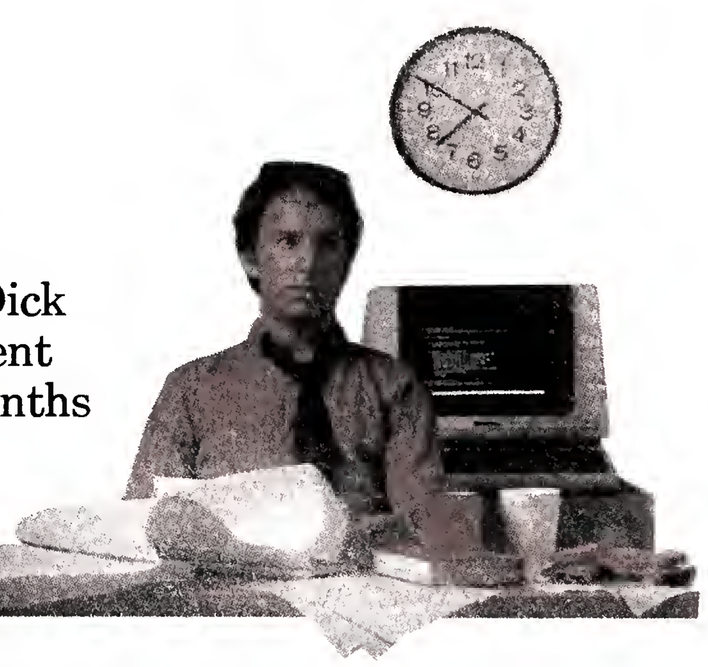
See COBOL.



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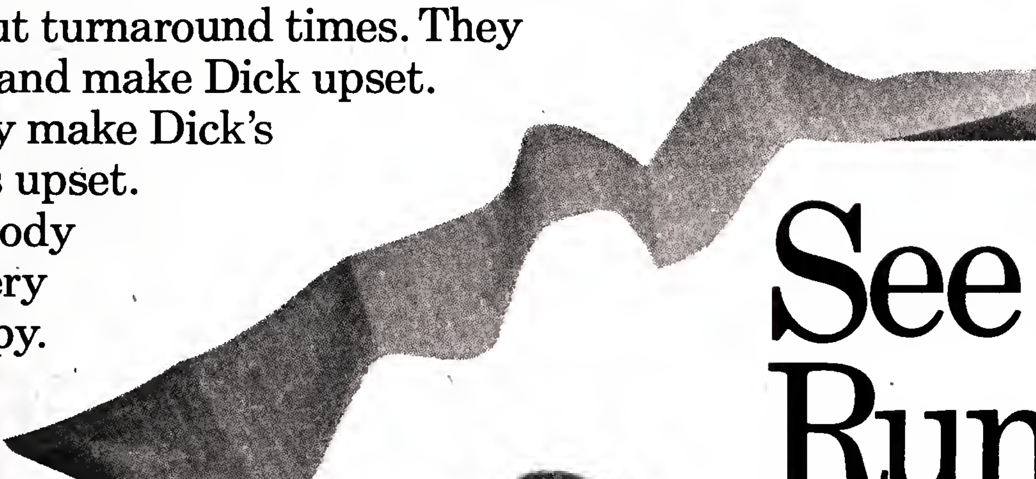

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Digital Research unveils link

PACIFIC GROVE, Calif. — Digital Research, Inc. has announced Starlink, an expansion board and software, which transforms an IBM Personal Computer into a four-user system.

Starlink consists of an Intel Corp. 8088 microprocessor, 64K bytes of random-access memory (RAM), four RS-232 serial port connectors, connecting cables and Digital Research's Concurrent PC-DOS, which simultaneously runs four programs using either IBM PC-DOS or Digital Research's CP/M operating systems.

With Starlink, four terminals or microcomputers (not necessarily IBM-compatible) can be linked through an RS-232 interface, according to the vendor. While users can share files and software, Starlink reportedly supports password protection and file locking so that specific information can be kept from unauthorized users, Digital Research said.

Starlink requires 512K bytes of RAM and runs on an IBM Personal Computer with two double-sided floppy disk drives or on an IBM Personal Computer XT. Digital Research recommends that the microcomputer have a hard disk.

Product shipments are planned for June. Starlink costs $1,695.

Digital Research is at 160 Central Ave., Pacific Grove, Calif. 93950.

IBM interest group announces public-domain directory, disks

SANTA CLARA, Calif. — The IBM Personal Computer Software Interest Group (PC-SIG) has announced a directory that lists hundreds of public-domain and user-supported programs written by authors who have chosen not to market their software.

Users can make copies of the programs without charge, the group said. Most public-domain programs are available in original source code form, allowing users to make modifications and provide examples of how to program.

The directory is available at bookstores or directly from PC-SIG for $4.95 plus $1 postage and handling. A set of the 10 most popular disks is priced at $59, and the complete set of 135 disks costs $814.

PC-SIG has its headquarters at Suite 130J, 1556 Halford Ave., Santa Clara, Calif. 95051.

SOFTWARE

CLARITY SOFTWARE CORP.
IFP-Exit

Clarity Software Corp. has introduced a program that translates Execucom, Inc.'s Interactive Financial Planning System (IFPS) models and data files into spreadsheet formats for Lotus Development Corp.'s 1-2-3 and Visicorp's Visicalc.

The program, IFP-Exit, reportedly operates under PC-DOS on an IBM Personal Computer or Personal Computer XT and requires 96K bytes of memory, two disk drives and a monitor. The program is said to be a two-pass system. In the first pass, the model is read, and a symbol table of variable names is built. In the second pass, the model is reread, and cell addresses and cell calculations are conducted.

IFP-Exit costs $3,000 for a one-time license fee, which permits unlimited copies of the program to be distributed within an organization, the vendor said. After June 30, the price will increase to $4,000.

Clarity Software, 11103 Spicewood Pkwy., Austin, Texas 78750.

R SYSTEMS, INC.
R Word

R Systems, Inc. announced its R Word word processing package is available for the IBM Personal Computer and the Texas Instruments, Inc. Professional computer.

Written in assembly language, R Word reportedly consists of several programs offering mail/merge, table math, spelling check and data base capabilities, according to R Systems.

Among the word processing software's features are the choice of eight colors as backgrounds, reverse video and underlined or highlighted text. A three-level file structure is used for document organization, R Systems said. The product is said to allow basic typing and filing tasks and the production of documents containing headers, footers, tables and footnotes.

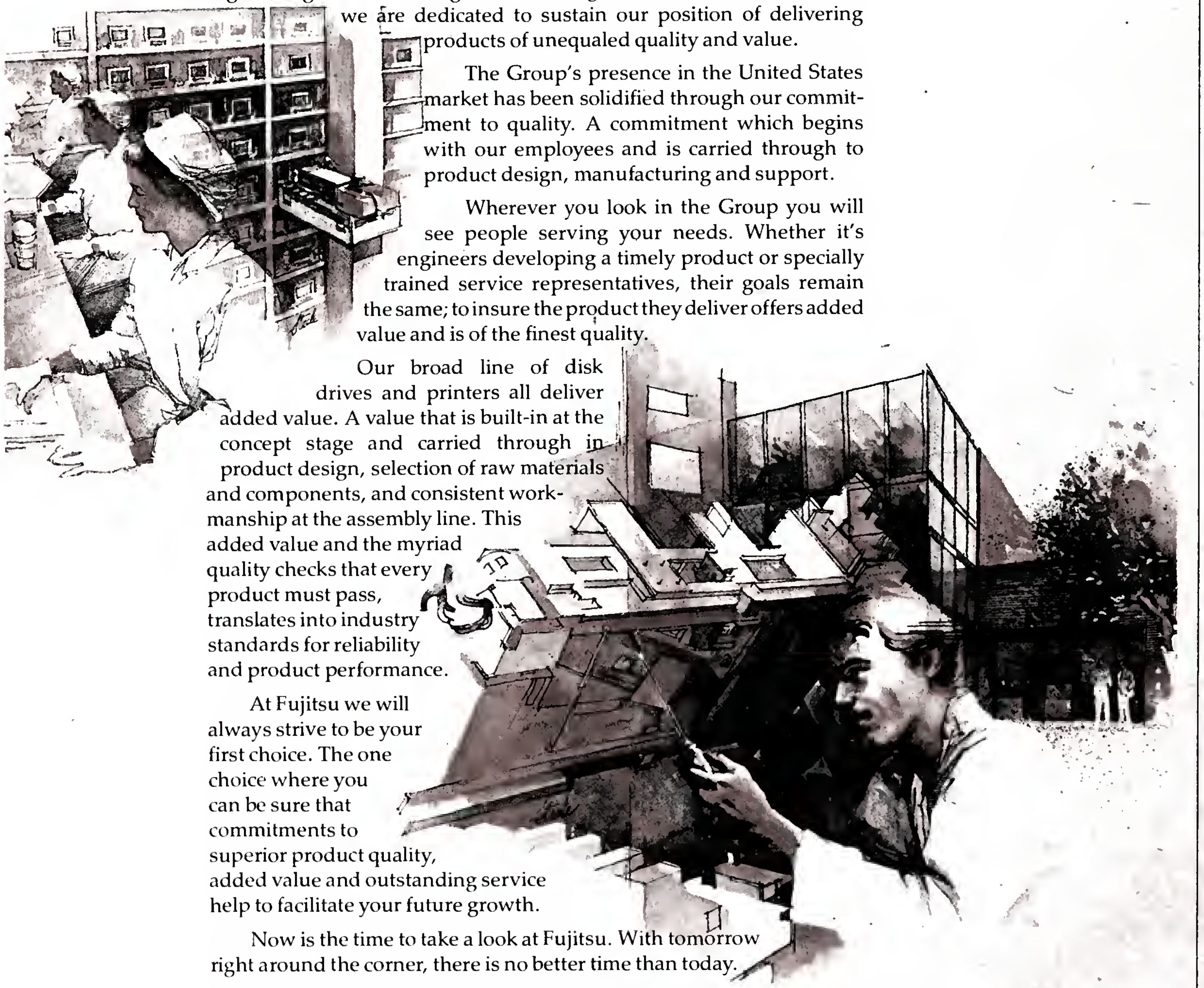
R Word requires 256K bytes of internal memory, uses either single- or dual-diskette drives and operates with a color monitor.

The package is offered for $395.

R Systems, 11450 Pagemill Road, Dallas, Texas 75243.

MICROSYSTEMS ENGINEERING CORP.
Mass-11pc

Microsystems Engineering Corp. has introduced a new version of its word processing package that runs on the Digital Equipment Corp. Rainbow, IBM Personal Computer and Ra-



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For more information contact Fujitsu America, Storage and Peripheral Products Group, 3055 Orchard Drive, San Jose, CA 95134, 408-946-8777.

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dio Shack 2000 microcomputers.

Mass-11pc reportedly features generation of tables of contents, split-screen editing and list processing. It also provides for automatic pagination with widow and orphan control, the vendor said.

Mass-11pc can operate with either hard disk- or floppy disk-based systems under Microsoft, Inc.'s MS-DOS operating system.

The program, which costs $995, requires at least 256K bytes of memory. Twenty-five printers can be supported, including several laser printers, the vendor said.

Microsystems Engineering, Suite 400, 2400 W. Hassell Road, Hoffman Estates, Ill. 60195.

EXTENDED SYSTEMS

ESI-2012, ESI-2014 Sharespool

Extended Systems has announced the ESI-2012 and the ESI-2014 Sharespool products, which allow up to three personal computers to share one printer.

Sharespool products reportedly act as intelligent printer interfaces, automatically buffering and managing print output. They require one full-length option slot in one IBM Personal Computer XT.

The ESI-2014 can share a parallel-interfaced Centronics Data Computer Corp.-compatible printer with up to three personal computers, the vendor said. The ESI-2012 reportedly allows use of a serial RS-232C interfaced printer. Both the ESI-2012 and ESI-2014 are said to be equipped with 64K bytes of spooler buffer space. The ESI-2014 and the ESI-2012 are priced at $595 each.

Extended Systems, P.O. Box 4937, Boise, Idaho 83711.

WORDTECH SYSTEMS, INC.

Db/Compiler

Wordtech Systems, Inc. has announced Db/Compiler, a compiler for Ashton-Tate's Dbase II that the vendor said can be substituted for Ashton-Tate's Runtime.

Compiled applications protect source code and are portable to different hardware configurations via Db/Compiler's cross-linkers, the vendor said.

The price for Db/Compiler is $750, and cross-environment linkers are $350 each. However, until July 15 the vendor is offering an extra linker free with the Db/Compiler.

Wordtech Systems, P.O. Box 1747, Orinda, Calif. 94563.

CDI SYSTEMS, INC.

Trio

CDI Systems, Inc. has introduced a software package for the IBM Personal Computer and compatible microcomputers that is said to eliminate the need to rekey data when Lotus Development Corp.'s 1-2-3 is used to analyze information contained in mainframe-produced reports.

The package, called Trio, reportedly allows users automatically to transfer files from an IBM mainframe to a Personal Computer and back, to extract data while selectively duplicating key fields required for analysis and to convert the data into the format required by 1-2-3 or other spreadsheet packages.

Trio, which also operates on the IBM Personal Computer XT and the IBM 3270 Personal Computer, reportedly produces an environment in which its modules can be executed independently.

Its data extraction module allows users interactively to select key data from the transferred file and refine the data prior to conversion to the spreadsheet format, CDI said.

Trio is available alone for $345 or in a package with 1-2-3 for $695.

CDI Systems, 2803 Butterfield, Oak Brook, Ill. 60521.

QUANTITATIVE SOFTWARE MANAGEMENT, INC.

Software Life Cycle Management

Quantitative Software Management, Inc. has introduced a program called Software Life Cycle Management (Slim), which reportedly gives users a color graphics representation of the various software alternatives available to them when they begin a software implementation project.

The Slim software, which runs on the IBM Personal Computer, is said to aid software managers and analysts in determining staffing needs, spending rates and risk and reliability. Slim also reportedly provides management with productivity measures for software development and allows identification of feasible solutions, minimum cost and minimum time for a software development project.

Information provided through use of Slim can aid in the planning and cost-justification of a proposed software system, the vendor said.

Slim is leased for $30,000 per year.

Quantitative Software Management, 1057 Waverly Way, McLean, Va. 22101.

MICRO FOCUS, INC.

High-Performance Level II Cobol

Micro Focus, Inc. has announced High-Performance Level II Cobol, a Cobol compiler for the IBM Personal Computer.

The compiler can assign multilevel commands to each IBM Personal Computer function key, Micro Focus said. The product reportedly supports screen attributes for color and monochrome displays, including foreground and background color selection, intensity and character blinking. Level II Cobol reportedly is compatible with Micro Focus' Personal Cobol and Animator programs.

Level II Cobol costs $1,995.

Micro Focus, Suite 235, 1860 Embarcadero Road, Palo Alto, Calif. 94303.

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MICROCOMPUTERS

SYSTEMS

INTERNATIONAL DIGITAL ELECTRONICS ASSOCIATES, INC.

Pcomm

International Digital Electronics Associates, Inc. has announced a workstation that reportedly combines communications and computing in one package.

Called Pcomm, the workstation communicates at speeds up to 56K bit/sec over Western Union Corp.'s Telex, TWX and International Telex; through direct distance dialing; or over leased lines, Idea said.

Pcomm also reportedly acts as a personal computer with between 64K and 576K bytes of random-access memory and floppy or hard disk storage of up to 10.3M bytes. Pcomm is said to run programs such as Micropro International Corp.'s Wordstar, Sorcim Corp.'s Supercalc, Ashton-Tate's Dbase II and other applications packages under Idea's own operating system.

Pcomm, which uses Intel Corp. 8085 and 8088 processors, is an upgraded version of the company's Bitelex unit, originally designed for communications applications. While the Bitelex station combines printer and keyboard into a single unit, Pcomm has a detachable keyboard and a separate printer, Idea said.

Prices for Pcomm start at $3,000. The product will be available in the fourth quarter of this year.

International Digital Electronics Associates, 6 Westchester Plaza, Elmsford, N.Y. 10523.

RAIR MICROCOMPUTER CORP.

Rair Supermicrocomputer

Rair Microcomputer Corp. has introduced Rair Supermicrocomputer, a system equipped with Intel Corp.'s IAPX 286 and IAPX 287 microprocessors, which together deliver an instruction execution rate of more than one million instructions per second and a floating-point multiply time of less than 24 msec.

Rair Supermicrocomputer accesses 1M-byte of random-access memory, according to the vendor. The product can support one or two 50M-byte hard disk drives and a 5¼-in. streaming tape drive with a transfer rate of 90K byte/sec and a storage capacity of 45M bytes, Rair said. Rair Supermicrocomputer can utilize 16 RS-232 serial ports, one IEEE 488 parallel bus and an Ethernet interface, according to the vendor.

The system runs under Digital Research, Inc.'s Concurrent DOS and the Unix V operating system.

Rair Supermicrocomputer costs $15,500.

Rair Microcomputer, 4101 Burton Drive, Santa Clara, Calif. 95050.

STORAGE

VERMONT RESEARCH CORP.

VRC 81 PC

Vermont Research Corp. has announced VRC 81 PC, a disk subsystem for IBM Personal Computers using IBM's PC-DOS 2.0.

VRC 81 PC provides 8-in. fixed and removable disk drive storage with a formatted data capacity of 21.4M bytes, with 10.7M bytes on the fixed disk and 10.7M bytes on a removable cartridge, Vermont Research said. The system reportedly includes the drive, a power supply, drive electronics, a controller, a cable and a host adapter.

VRC 81 PC costs $6,420. A removable disk drive system with 10.7M bytes of storage sells for $5,920.

Vermont Research, Precision Park, North Springfield, Va. 05150.

ACKNOWLEDGE, INC.

Tape Backup System

Acknowledge, Inc. has announced two versions of a cartridge tape storage system, one designed for the IBM Personal Computer and another that stores data produced by both IBM Personal Computers and Wang Laboratories, Inc. Professional micros.

Tape Backup System is file-oriented and permits users selectively to backup and recover data, Acknowledge said. The four-track, 6,400 bit/in. serial cartridge drive reportedly can handle 17.5M bytes of data.

The version for the IBM Personal Computer costs $2,795. The version for the IBM Personal Computer and Wang Professional costs $5,995.

Acknowledge, 55 Union Ave., Sudbury, Mass. 01776.

PRINTERS/PLOTTERS/ PERIPHERALS

CAL-ABCO

Legend 1000

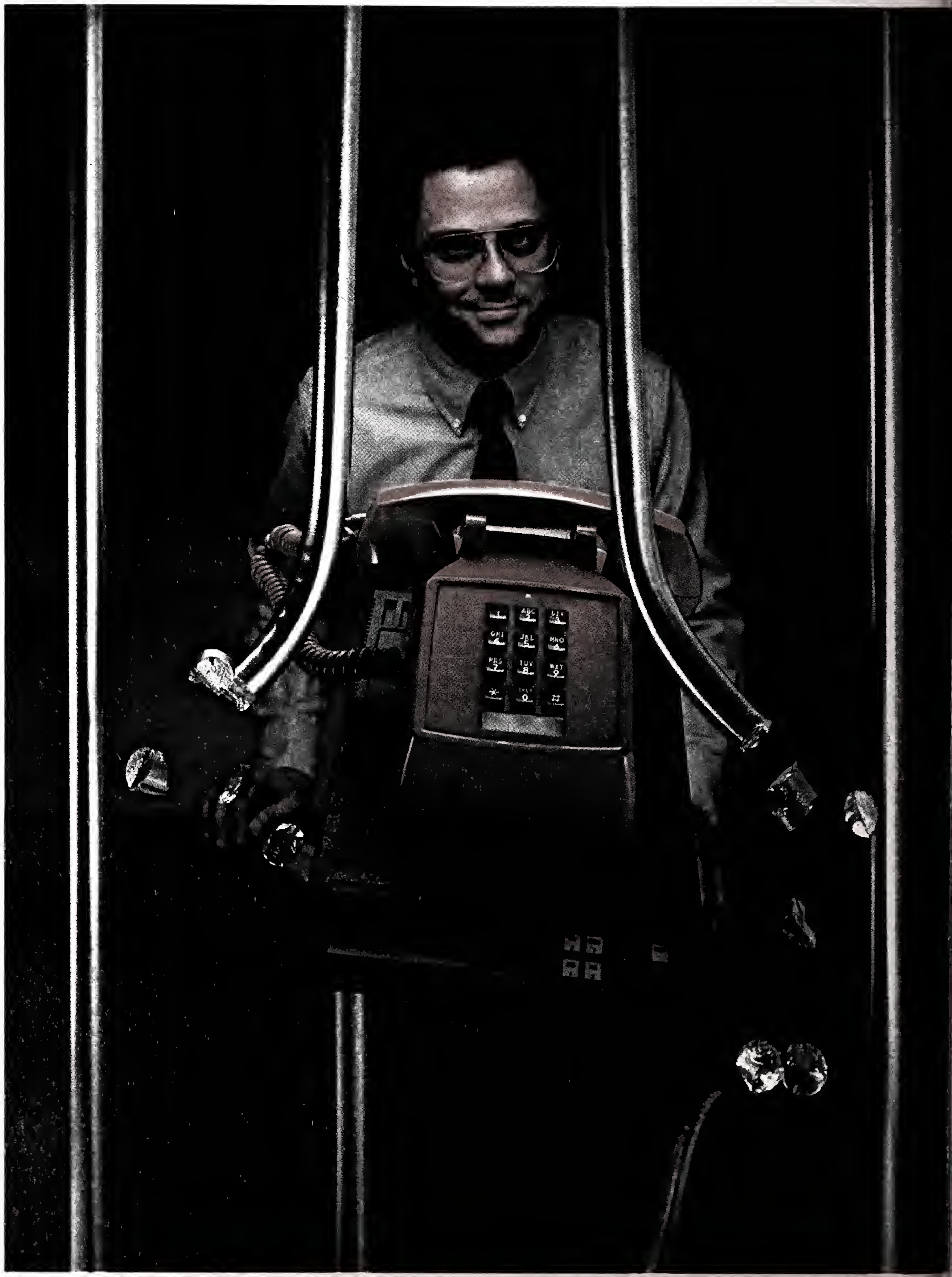
Cal-Abco has introduced a dot matrix printer with a nine-wire print head. The print head has an average life span of three years when printing at a rate of 100 page/day, the vendor said.

The printer, Legend 1000, also reportedly offers a 9- by 11-dot matrix, logic-seeking bidirectional printing and incremental printing. It is said to have five user-selectable character sets. Legend 1000 also offers pica, elite, condensed, double-width and double-width condensed modes, according to Cal-Abco.

Legend 1000 is said to be compatible with any microcomputer using a parallel port and can be modified to operate in conjunction with a serial port as well.

Legend 1000 is priced at $359.

Cal-Abco, 14722 Oxnard St., Van Nuys, Calif. 91401.



BOARD-LEVEL DEVICES

SEATTLE COMPUTER
Ram+6

Seattle Computer has introduced Ram+6, a multifunction card for the IBM Personal Computer and Personal Computer XT.

The card includes a time-of-day clock and calendar with battery backup, a parallel printer port, a game port and 64K bytes of random-access memory (RAM), expandable to 384K bytes, Seattle Computer said.

Two Seattle Computer software programs are included on the board. Flash Disk is said to allow a portion of memory to be used as if it were a disk drive so that disk operations are speeded. Flash Print sets user-defined print buffers in 1K-byte increments with a maximum of 64K bytes.

The Ram+6 with 64K bytes of RAM costs $395.

Seattle Computer, 1114 Industry Drive, Seattle, Wash. 98188.

AUXILIARY EQUIPMENT

INSTRUMENTATION AND CONTROL SYSTEMS, INC.
Lifeline Micro Ups

Instrumentation and Control Systems, Inc. (ICS) has announced Lifeline Micro Ups, a 1 kVA power supply.

The power supply provides continuous voltage regulation and line filtering and features an inverter that supplies power during power outages, ICS said.

Lifeline Micro Ups is designed to plug into a 120 Vac wall outlet and costs $2,500.

ICS, 520 Interstate Road, Addison, Ill. 60101.

COMMUNICATIONS

PRENTICE CORP.
Popcom Model C100

Prentice Corp. has announced the Popcom Model C100 modem card, a 1,200 bit/sec autodialing modem card for the IBM Personal Computer, Personal Computer XT, Portable Personal Computer and IBM slot-compatible machines.

The C100 reportedly uses two custom Cmos integrated circuits to achieve full-duplex operation, tone sensing and voice/data control. The C100 consumes less than 1W of power, Prentice said.

The C100 is slated for availability in June at a price of $445, the vendor said.

Prentice, 266 Caspian Drive, P.O. Box 3544, Sunnyvale, Calif. 94088.

FTC COMMUNICATIONS
Message Handler

FTC Communications has announced Message Handler, a software package that allows an IBM Personal Computer or Personal Computer XT to emulate a telex or message terminal.

It reportedly provides foreground and background capabilities so the user can send and receive messages while working with a microcomputer software program. It costs $295.

FTC Communications, 90 John St., New York, N.Y. 10038.

2001

from page 93

ments of its Attache 8:16T, which meets government "Tempest" data security requirements, are scheduled to begin next month.

Otrona is located at 4725 Walnut St., Boulder, Colo. 80301.

ASSIST

from page 93

plates that work with Filing Assistant. Executive Solutions, selling for $60, reportedly formats mailing lists, stock portfolios and checking accounts. Accounting Solutions, carrying an $80 price tag, is said to include formats for payroll invoices, inventory, personnel information and general ledger. Home Solutions, available .for $60, includes tables for tracking stocks, coupons, home finances and addresses.

Each program requires 128K bytes of random-access memory and a double-sided disk drive.

All programs will be available this month, except for Planning Assistant, which will be shipped in the first quarter of 1985. Until November, current PFS:Report or PFS:File users can upgrade to Filing Assistant or Reporting Assistant for $45, a spokesman said.

IBM is located at Old Orchard Road, Armonk, N.Y. 10504.

TERMS

from page 93

like a portable television, then the machine was portable, according to Kay. As small, light, battery-operated computers were introduced, Kaypro dropped the term portable.

New discrepancies appear imminent. For example, Alpha Software Corp. says its Electric Desk, an integrated package for the IBM PCjr, is multitasking and supplies windows.

Multitasking, according to Alpha, allows users to suspend an operation and return to it after working with another application. In this view, multitasking does not involve concurrent processing. But concurrent is generally considered synonomous with multitasking.

Electric Desk's windowing capability consists of a screen split into two parts — not an elaborate windowing system.

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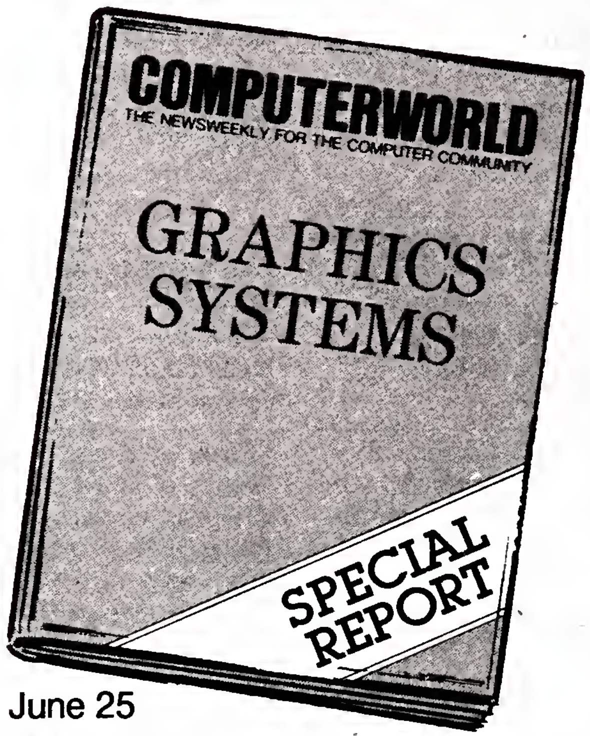
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GRAPHICS SYSTEMS
SPECIAL REPORT

June 25

Graphics Systems
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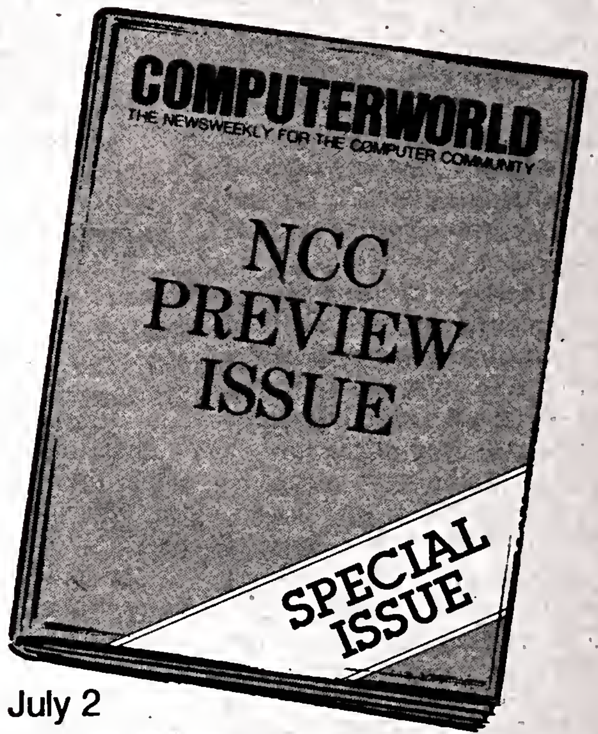
Closes June 8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NCC PREVIEW ISSUE
SPECIAL ISSUE

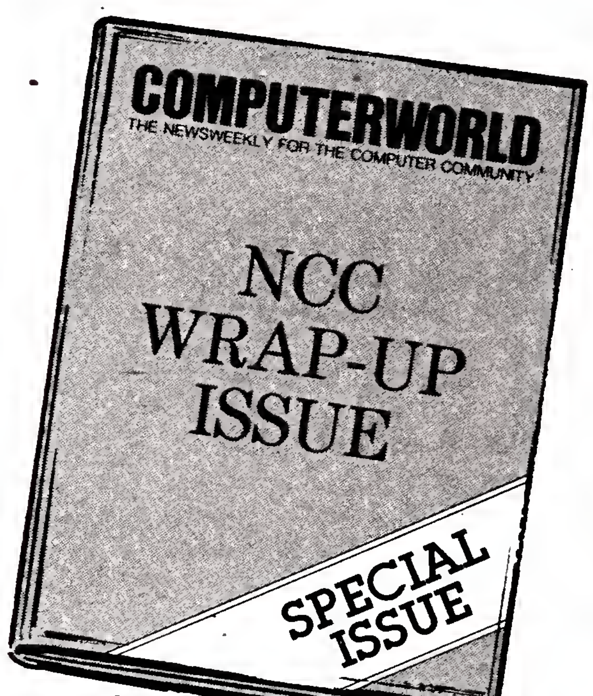
July 2

NCC Preview issue
A detailed roundup of the vendors and products to see at the show (complete with booth numbers). Plus we'll take a look at the special attractions in Las Vegas.
Closes June 15

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
NCC SHOW ISSUE
SPECIAL ISSUE

July 9

NCC Show issue
We'll highlight *Data Pro's* yearly hardware survey. Readers always enjoy studying other user's candid ratings of systems and vendors.
Closes June 22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NCC WRAP-UP ISSUE
SPECIAL ISSUE

July 16

NCC Wrap-up issue
Part 2 of *Data Pro's* hardware survey. Also, we'll recap the major product announcements and happenings at the show.
Closes June 29

COMPUTERWORLD
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MINIS AND SMALL BUSINESS SYSTEMS
SPECIAL REPORT

August 27

Minis and small business systems
We'll take a close look at the growing number of applications. Plus we'll offer vendors' suggestions on how to increase the efficiency and cost-effectiveness of minis and small business systems.
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COMPUTER INDUSTRY

Apple's sweet school deal sours some dealers

By David Olmos
CW Staff

Apple Computer, Inc.'s program to sell its Macintosh microcomputer to 24 colleges and universities at a hefty discount may win the hearts of students, but it has soured some Apple dealers.

The Apple University Consortium program enables schools to purchase Macintoshes at about a 60% discount for sale to students and staff. The program, reportedly worth $60 million in sales for Apple, is clearly aimed at increasing the microcomputer giant's presence in the college market.

But some computer store dealers located near consortium campuses complain that Apple's program is leaving them out in the cold by taking away a valuable market.

"The University of Michigan has no business selling retail computers," said Rick Weir, president and co-owner of the Complete Computer Center in Ann Arbor, Mich. "They are unfairly competing with the private sector."

Patrice Johnson, president of the 54-member Association of Computer Retailers (ACR), said dealers want Apple to channel sales to colleges through their stores. "Our view is that Apple needs dealers, and it needs to have a nationwide support service for its products," she said. "In shortcutting the dealers like this, they're only hurting themselves."

"I think the program clearly hurt our relationship with some of those dealers," conceded Burt Cummings, Apple's program manager for university sales. But he maintained that for every dealer who has complained about the program, "there are two to three dealers who are jumping to pick up the accessory market" for peripherals and software.

Cummings said the Apple Dealer Council endorsed the consortium plan as being in the best interest of both the company and its dealers.

Ken Kozikowski, who operates Harvest Computer in Cambridge, Mass., near Harvard University, said he has no gripes with the consortium. In fact, he said, "I'm benefiting from the program." He said he has made sales to Harvard faculty and students who prefer to get the Macintosh now rather than wait until the university can supply the machines. "They're [Harvard] not offering service, they're not offering software. Students are only getting a box," he said.

One dealer with mixed feelings about the consortium is Bernie Bise, owner of Chips Computer Center, Inc., located five blocks from Dartmouth University in Hanover, N.H. Bise said his sales have not yet been hurt by the program, and he actually hopes to benefit by working out a service agreement with Dartmouth. He said his biggest concern is that Apple is confusing buyers about the Macintosh's value.

"What is the value of the Macintosh, $2,495 or $1,195?" he said. "That seems to be the upsetting message Apple is creating as far as I'm concerned," according to Bise.

Apple's program is an attempt to gain not only a bigger share of the university market, but also to reap the benefits of technological advances and new microcomputer software. Under the program, each university is expected to develop new instructional software on Apple products and to share information with other con-

See **APPLE** page 119

Schools wary of black market

By David Olmos
CW Staff

The Apple University Consortium program, which will place an estimated 50,000 Apple Computer, Inc. Macintoshes in the hands of students and staff this year, has sparked fears that many machines may end up in the grasp of black marketers.

Macintosh sells for about $2,495 retail. Consortium schools are paying $1,000 for the machines and selling them to students for between $1,000 and $1,395, or less than the wholesale price.

Apple, which claimed 70,000 Macintoshes were sold in its first 100 days on the market, has a large backlog of orders from both universities and dealers. There are indications that some cash-

See **RESELL** page 119

- A new management team and a new line of computers are said to be the tonic needed to get Franklin Computer Corp. out of its recent malaise/**102**
- A quarter of electrical engineers are not too happy with their jobs, according to a Harris poll commissioned by the IEEE/**110**
- IPL Systems, Inc. and Masstor Systems Corp. both reported losses for the most recent financial quarter/**111**
- The next people to "shake hands with the future" may be the citizens of the People's Republic of China, if a venture between their government and Computerland Corp. goes smoothly/**114**

INDUSTRY INSIGHT/PETER BARTOLIK

Raytheon drops Data Systems to tune of $95 million

Apparently finding the heat just a touch too high, Raytheon Co. disbanded its Data Systems Division, perhaps finding the commercial market a might unfriendly in comparison with dealing with the U.S. government.

How a company that was the second largest supplier, behind IBM, of 3270-type terminals could run its business into the ground certainly has to be one of the more puzzling developments of this confusing era.

Considering that the company had dominated the airline reservations business and had acquired Lexitron Corp., a leading vendor of stand-alone word processors, Raytheon's Data Systems on the surface appeared to have valuable name-recognition assets.

But with the airline business satiated, except perhaps for an expensive next-generation product and with many, many competitors jumping into the terminal market these days, Raytheon apparently just didn't have the stomach anymore.

Strangest of all is that Raytheon couldn't sell off its Data Systems Division and will end up eating a $95 million loss.

Spokesmen for the division and parent company said that parts of the division could have been sold to different parties, but that the company didn't want to go that route.

While Wall Street generally reacted positively, I wonder what the stockholders feel about that?

■

Coming on the heels of its recent settlement of charges for false certification of microcircuits purchased by the military, National Semiconductor Corp. expressed great pride recently in announcing Control Data Corp. has enough confidence in National Semi quality to accept products on "a ship-to-stock basis."

To qualify for skipping CDC's incoming tests, National Semi said it had to have 100% lot acceptance for the six months preceding certification, with a minimum of 10 lots per device processed for inspection.

Senate OKs bill extending copyright protection

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The U.S. Senate recently approved a bill to provide 10-year copyright protection for semiconductor designs. A substantially similar bill is now moving through the House of Representatives, raising the prospect for final approval of the legislation by the end of the year.

Passed by the Senate May 16 on a voice vote, the Semiconductor Chip Protection Act of 1984 would allow legitimate reverse engineering of chips protected under the legislation and would provide legal immunity, under certain conditions, for those who innocently infringe on chip copyrights.

The legislation, under active consideration in both houses since last summer, has generated considerable controversy. Even within the electronics industry there were those who argued copyright law is not the best or most appropriate mechanism for computer chip protection.

The bill's supporters, including its chief sponsor, Sen. Charles Mathias Jr. (R-Md.), however, argued that protection was necessary and could not wait until a new or better form could be found. The Semiconductor Industry Association agreed, claiming the legislation is "the only practical method of protecting our valuable patterns."

The House version, on the other hand, would establish a separate form of intellectual property protection for semiconductor designs.

But Mathias said he is "confident that there will be sufficient common ground between [the two bills] to make possible a

See **BILL** page 119

CX micros, staff changes seen key to Franklin future

Alleged mismanagement makes future questionable

> *'We should have been more cautious, given that we didn't have a big [financial] cushion. [Franklin] never had a very strong capital base and was never able to get a proper banking relationship.'* — Avram C. Miller, former Franklin Computer Corp. president.

NEW YORK — The CX line of microcomputers introduced here earlier this month by Franklin Computer Corp., along with the shake-up in its corporate ranks, will turn the company around, according to Joel Shusterman, executive vice-president and acting president of the Pennsauken, N.J.-based computer maker.

In remarks to reporters during the announcement of the new products here at the Hayden Planetarium, Shusterman delivered a harsh assessment of the previous management team which he said "was living in a dream world."

The CX line is a series of Apple Computer, Inc.-compatible microcomputers that weigh 25 pounds (story on page 94). Classified as transportables, they run programs written for Microsoft, Inc.'s MS-DOS and Digital Research, Inc.'s CP/M 2.2 operating systems, as well as F-DOS, the Apple II-compatible operating system that Franklin developed together with independent houses Central Point Software, Inc. and Laser Software.

Borden resigns

Only 48 hours before the unveiling of the CX micros, R. Barry Borden, 44, resigned as president of the beleaguered firm. Borden himself had served only 34 days after stepping in for Avram C. Miller, who resigned under pressure as Franklin's president on April 6.

Franklin was founded three years ago as a vendor of Apple-compatible micros with a disk operating system that was a code-for-code copy of Apple's DOS 3.3. The firm was forced to develop its own operating system software as part of the $2.5 million out-of-court settlement of its copyright infringement lawsuit with Apple [CW, Jan. 9]. Under terms of that settlement, Franklin had to stop selling boxes with the Apple-mirrored software on April 1.

"There are those who believe this company should have had its own operating system in place all along," said Edward F. Golderer, Franklin's director of marketing, newly appointed to replace Eugene H. Sherman, who was pressed to resign as marketing vice-president on May 10.

Asked if Miller, Borden and Sherman had paid the price for Franklin's mistake in not developing a proprietary operating system, Shusterman replied, "That was an oversight on everyone's part." The three were squeezed out because they had "lost control of growth" and had "misused and misplaced" company personnel, Shusterman said.

Contacted at his home in Bala Cynwyd, Pa., Miller denied any mismanagement. "That's like blaming the Belgian Army for losing the war with Germany. The problems that company has are not the fault of any one individual," Miller said.

The former Franklin president, who joined the micromaker in March 1983 from Digital Equipment Corp., said of his 13 months at the helm that "we should have been more cautious, given that we didn't have a big [financial] cushion." Miller said Franklin "never had a very strong capital base and was never able to get a proper banking relationship."

Borden said his resignation was a mutual decision between him and the board. "These things are never simple," he said, He admitted he and the board had conflicts. He said he would not characterize the situation as Shusterman did. Sherman could not be reached.

Franklin enjoyed a 153.6% jump in sales to $71 million in the year ended March 31, from $28 million the year before. But when asked if the closely held vendor had turned a profit this past year, Shusterman said, "I can't answer that."

Franklin sliced its employment rolls by 14% to 450 workers in the past two weeks. "There's no question we were overstaffed," Shusterman said. "The previous management of this company was living in a dream world."

The CX micros will be handled by Franklin's league of 1,400 dealers. But dealers reacted with caution to news of their unveiling.

Franklin dealer Robert Silverman, president of the Computer Center, Inc. here, said he would agree to carry the CX line only "in a very cautious manner," adding his four stores would not stock "very heavy inventories."

Customers have shown some reluctance to buy Franklins instead of Apples, according to Silverman.

Whether the company survives "depends on this [CX] product," according to Leigh Goldstein, president of Leigh's Computers and a Franklin dealer here. But Goldstein, who said customer interest in Franklin systems had dropped, declared that unless the new micros were compatible with IBM Personal Computers "they are dead."

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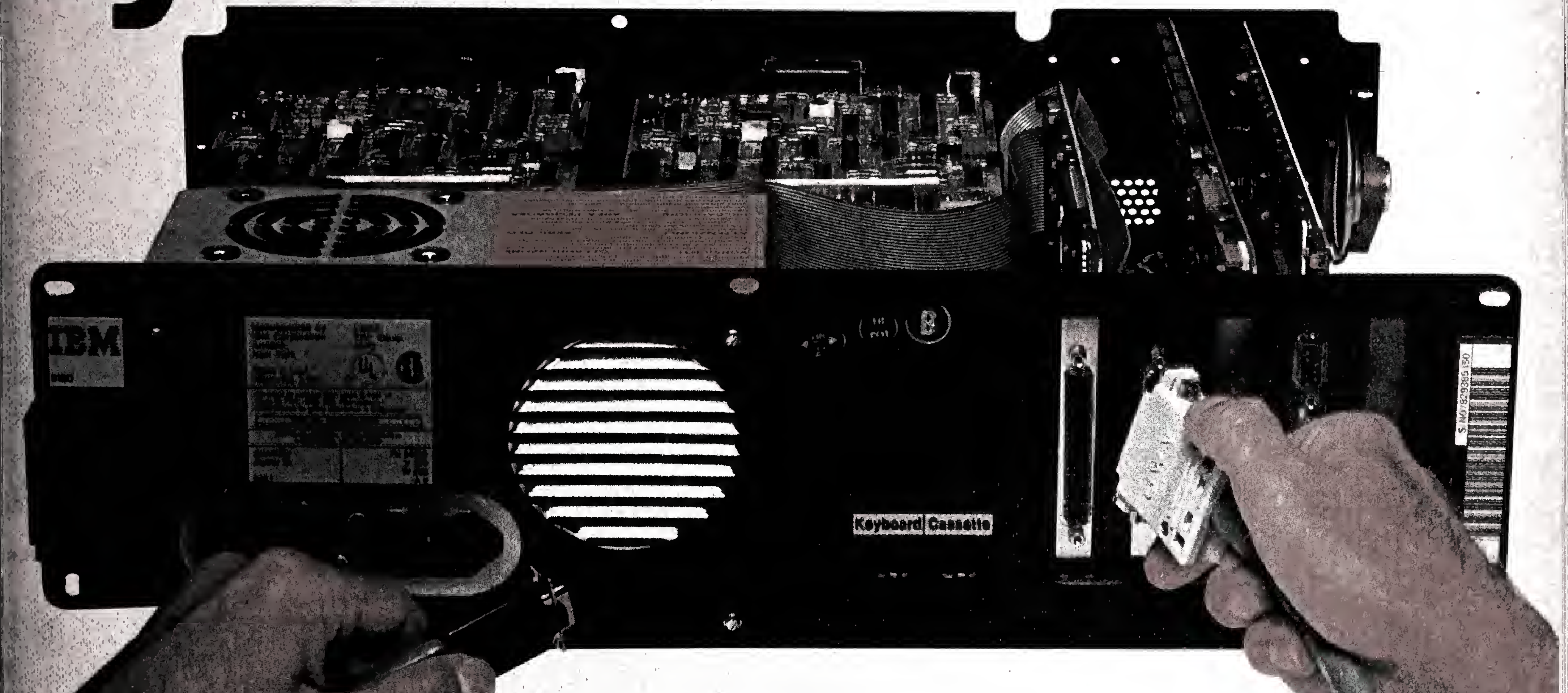

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EEC antitrust ruling may charge IBM with abusive

By Alonzo D. Saunders
Special to CW‡

It is widely anticipated that, perhaps as early as June, the European Economic Community's (EEC) antitrust authority will, after five years of investigation, officially charge IBM with abusive practices in connection with the plug-compatible manufacturer (PCM) market.

The European Community Commission has been flexing its muscles during the last 10 years and has always sought to be known as hard-nosed when it comes to dealing with monopoly-type behavior. In the lucrative high-technology age, the Europeans, through the EEC and its commission, intend to make Europe as competitive as possible.

It is hard to see how even the commission's professional staff could resist rocking IBM's yacht, given this mix of political and economic factors. And the commission has precedent going back to 1974.

Chemical case

In the 1974 Commercial Solvents case, a U.S. chemical company refused to sell products used to manufacture a drug marketed by that company in Italy to Italian third parties. The European Court, where commission charges are appealed, ruled in favor of the shutout competitors. In this IBM matter, IBM made it difficult for competing PCMs to obtain the information necessary to stay plug-compatible. IBM and the chemical company both dominated their markets. The chemical case shows that a company with a dominant position cannot refuse to provide products to potential competitors.

A slight but important difference in the IBM case may illuminate the commission's current thinking. IBM did not refuse to disclose the information, but it did disclose it late. If the commission charges IBM with a violation, it must have concluded that in the plug-compatible market, late is equivalent to not at all. It may base its decision in part on the belief that the European non-IBM PCMs are in competitive disarray.

So if the commission wants to make an example of IBM, it can do so, and to do otherwise would give the appearance of caving in to the U.S. Justice Department, which dropped its U.S. suit against IBM and has been urging the commission to do likewise.

Timely disclosure is the key point in more ways than one. There is speculation that the commission leaked its intentions early to pressure IBM into a negotiated settlement. The commission knows, as does IBM, that the final resolution of this case will — if it ever comes to that — take place in the very same court that rendered the Commercial Solvents decision. The commission has reportedly turned down one previous IBM settlement offer. By leaking its intentions, the commission turns up the heat on IBM.

One significant result of the expected charge is that the commission will, at a stroke, preserve competition in the European PCM market. The charge encourages increased participation by non-IBM European PCMs. If the commission is this bullish on the market, there is no reason for PCMs to be any less so.

Analysis of the marketing implications by PCMs should first include a plan to act aggressively to obtain contractual terms and conditions more favorable than heretofore possible. PCM manufacturers should try to obtain better terms of delivery, acceptance, credit and service as well as any other terms

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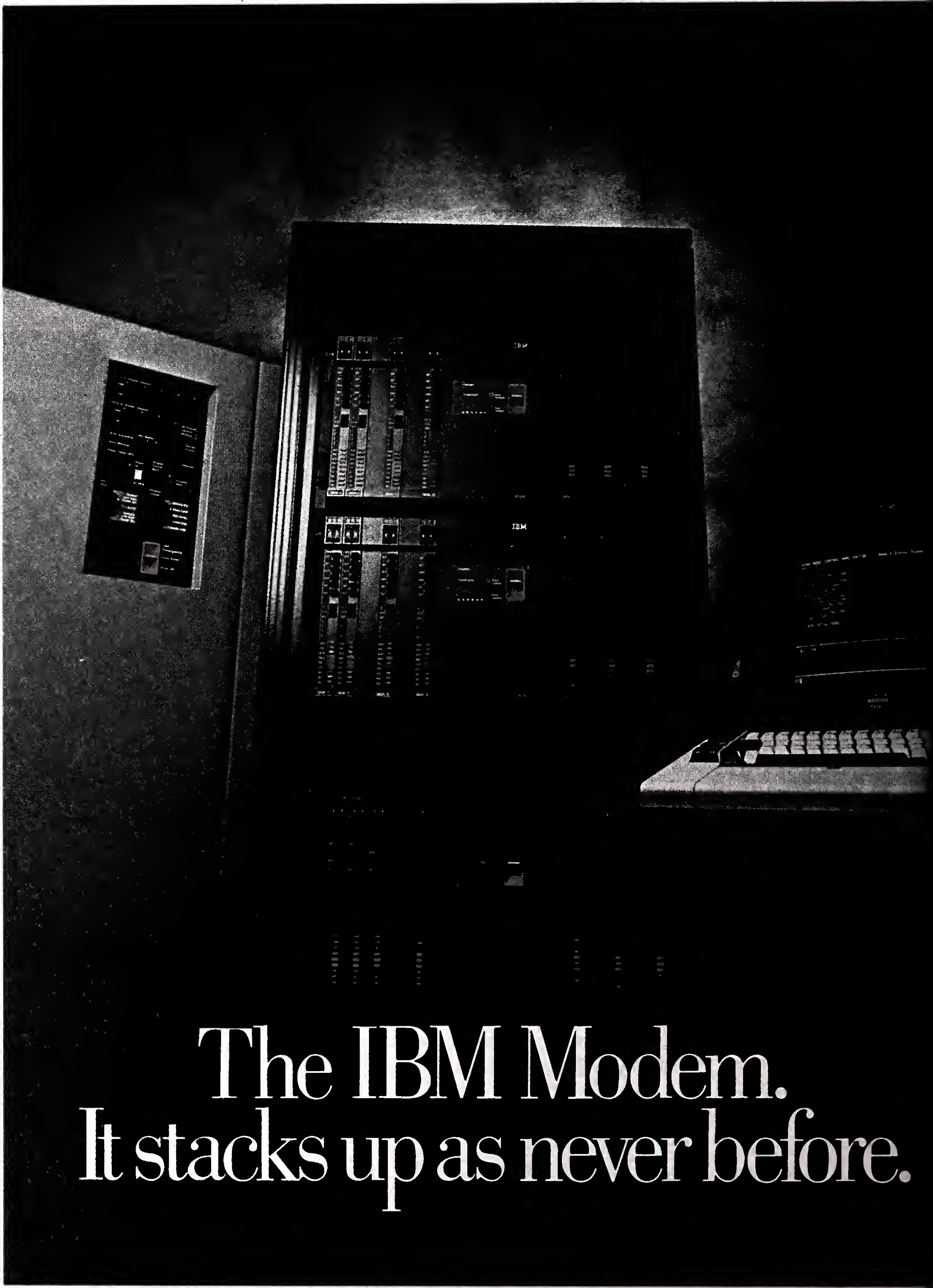
Saunders is a Boston-based attorney with a practice focusing on international marketing, antitrust issues and corporate finance.



practices in connection with European PCM mart

that they believe put them at a competitive advantage.

Second, analysis should be conducted on whether purchasers are buying exactly what they want or are being forced to buy something in addition. Being forced to buy product X when you buy product Y may constitute illegal tying, and tying is an issue in this EEC investigation.

Third, PCMs can also consider making the commission's procedures work more for them. The EEC's flexible, informal approach to anticompetitive behavior allows companies with marketing, sales and distribution agreements and plans that they believe may run afoul of the law to be reviewed by the commission before being put into practice.

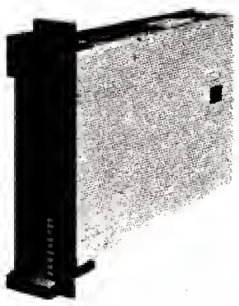
Finally, the creation of an R&D pool or a patent pool can allow the PCMs to exercise countervailing power in the market by organizing, for review by the authorities, a company that would have sole responsibility for receipt of IBM information or for developing the much-needed technical information.

A lot to lose

IBM feels it has a lot to lose, should the charge stick. It is adamant about its right to the economic return that should accrue from its investment and does not want partners to share the reward. To be forced to do so by the commission retards innovation and wrongfully transfers proprietary information in the form of disclosure without adequate compensation. IBM will, in the short term, make no changes to its current operations, including its well-known strategy of shipment long after announcement.

However, in the long run, IBM will have increased competition, spurred in part by the mere rumor of EEC action. This will force IBM to be more considerate about what it feels is proprietary information, more sensitive to the market and more competitive across the board with its terms and conditions.

Attempts to break Big Blue's grip on the European PCM market will encourage more competition from European manufacturers, rock IBM's boat and signal both to the U.S. and Japan that Europe intends to be a force in the high-technology future. The PCM market will never be the same, and that, presumably, is the way the commission wants it.



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Computer Devices airs profits

NUTTING LAKE, Mass. — Computer Devices, Inc. reported that its first-quarter profits for the period ended March 31 were $207,000, or 5 cents a share, compared with a loss of $1.2 million, or a decline of 43 cents a share, a year earlier.

Revenues for the quarter were down sharply to $1.7 million, compared with $7.4 million a year ago.

The company has been operating under the protection of Chapter 11 of the Federal Bankruptcy Act since last October.

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AI to propel into $2.8 billion range by 1990, study says

By Robert Batt
CW West Coast Bureau

SCOTTSDALE, Ariz. — The U.S. market for artificial intelligence (AI) technology is set to take off within the next two years and will reach $2.8 billion by 1990, according to an industry study due to be out in June.

The report, titled "AI Trends '84" from DM Data, Inc., a market research firm based here, also claimed that the emergence of AI techniques will lead to the large-scale distribution of computer capabilities and will remove the need for large DP shops in many corporations.

According to the report, the AI market will grow most rapidly after 1986 as cost/performance ratios improve and new products such as voice-actuated word processing and voice-commanded data retrieval become viable.

The study divides the market into five areas: expert systems, natural language software, computer-aided instruction, visual recognition and voice recognition.

"The fastest growth areas are natural language, at a compound rate of over 75%, and expert systems, at a compound rate of over 70%," the report said. According to DM Data, the number of firms manufacturing expert system software products has doubled over the last year.

"New approaches to the creation of expert systems, such as the availability of a 'calc-like' framework, are expected to have a major impact on this market. Just as the software program Visicalc [manufactured by Visicorp] helped to create the personal computer industry, so, several new software programs have the potential of bringing AI expert system capabilities out of the university and into the hands of the business user.

"New software programs are now available which allow the unknowledgeable user to develop custom expert systems for a variety of applications at very low cost. At present, this type of program is budgeted at a $1 million-plus range and requires several man-years of professional programmers to be marketable."

However, the report continued, natural language techniques will eventually be incorporated into most software packages and are expected to exceed 20% of the total market value of all software.

Three types of software

The report named three examples of this new type of software:

- ■ Advanced Reasoning Tool, a proprietary product from Inference Corp.
- ■ Knowledge Engineering System, a product manufactured by Software Architecture and Engineering, Inc.
- ■ Knowledge Engineering Environment, made by Intelligenetics, Inc.

Even though these products, which run on the equivalent of a Digital Equipment Corp. VAX computer, are still relatively primitive in nature, they allow users to create their own expert software operating system in weeks instead of years. And they can already be economically applied to such areas as finance, maintenance and health services.

"As the industry becomes more experienced with this approach and the documentation improves, this do-it-yourself approach to creating expert systems will increase dramatically because of its cost-effectiveness and security aspects and is expected to constitute over 50% of the market by 1988," the report said.

In other areas of AI, the report said the market for visual and voice recognition techniques will not develop rapidly until after 1986, when new software approaches and algorithms are expected to become commercialized.

"AI Trends '84" is available for $195 from DM Data at Suite 1000, 6900 E. Camelback Road, Scottsdale, Ariz. 85251.

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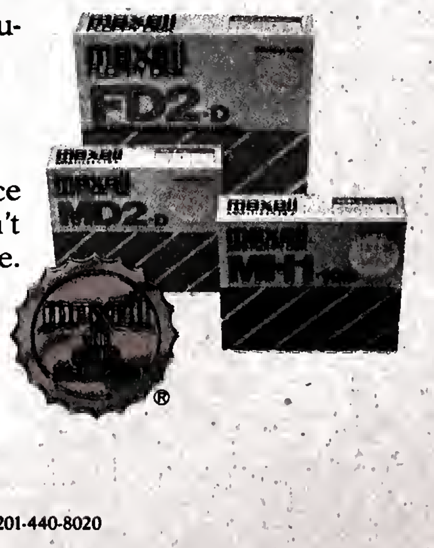

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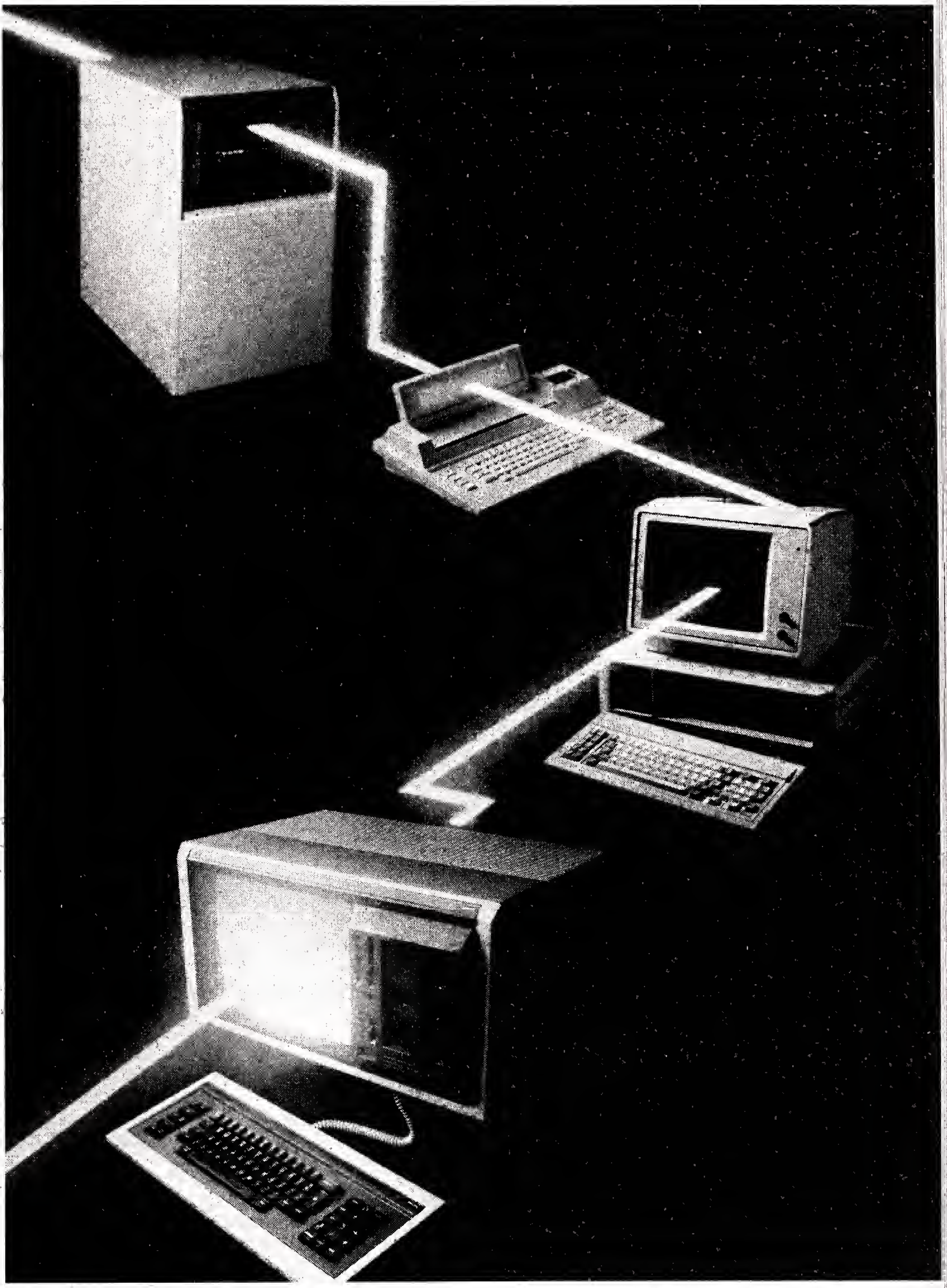

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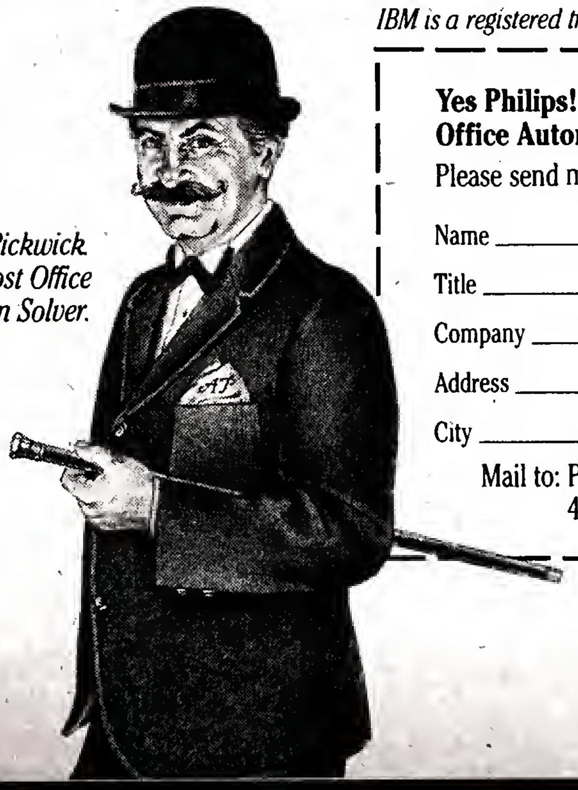

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CW 5/28

IBM seen magnifying its business graphics efforts

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — IBM, during the coming months and years, will greatly intensify its efforts to meet the graphics needs of corporate MIS managers, according to Jeff Anderson, marketing director at the graphics software firm of Issco, Inc.

For years, Big Blue followed developments in the business graphics field mainly as a spectator. The result was that information systems managers were often forced to turn to "the non-IBM world to obtain the graphics tools their end users are increasingly demanding," Anderson said last week at the fifth annual conference of the National Computer Graphics Association (NCGA).

But during just the last year or so, the industry giant has clearly begun to rethink its old attitudes toward business graphics and has plunged into the fast-growing field with a vengeance, he said.

IBM's expanded activities as a business graphics vendor are reflected in the company's product line, which has grown recently to include the Model 4250 graphics copier and the Model 5080 color video terminal. Both units were on display last week in the firm's exhibit on the NCGA conference floor.

Even the IBM booth's location symbolizes the vendor's newly awakened interest in the business graphics sector, Anderson said. Strategically situated not more than 20 feet from the exhibit area's main entrance, the Big Blue product display ranked among the NCGA exposition's most conspicuous sights.

For Anderson, Big Blue's heightened presence at this year's NCGA gathering foreshadows a continued growth in the firm's graphics-related activities. In the near future, the industry giant's main mission in the business graphics arena will be to introduce products that provide significantly better features and functionality than the offerings the company sells today.

In particular, Anderson expects IBM to improve the quality of its terminals substantially, both in their resolution and the extent of the color selection.

Current limitations in the IBM Personal Computer's output quality have made the micro unsatisfactory as a graphics tool for many end users, who have frequently opted instead for non-IBM alternatives.

But in the future, the firm will almost certainly remedy the limitations in its graphics capabilities and thus satisfy user demands for increased resolution, Anderson said.

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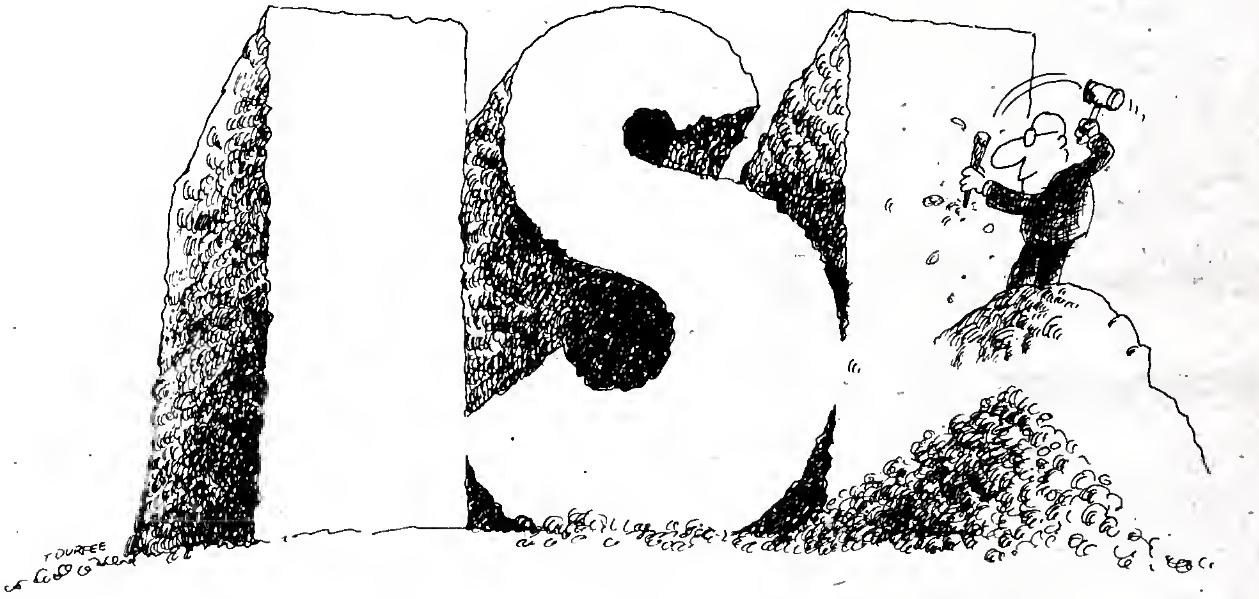

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QIC proposes ¼-in. format

SAN DIEGO — The working group for Quarter-Inch Cartridge Drive Compatibility (QIC) is proposing as a worldwide standard a 120M-byte class of ¼-in. cartridge tape drives utilizing error correction code.

The QIC will present its recording format proposal, called QIC-50, at the group's meeting June 13-14 in Oslo, Norway.

"The QIC-50 format will provide read compatibility with current 4-track and 9-track cartridges which utilize the QIC-24 recording format," said Raymond C. Freeman Jr., QIC facilitator and president of Freeman Associates, a Santa Barbara, Calif., consulting firm specializing in data storage markets and products.

QIC, a computer industry group, was established to spur widespread use of ¼-in. cartridge tape drives through the development of proposed standards that will encourage industrywide compatiblity.

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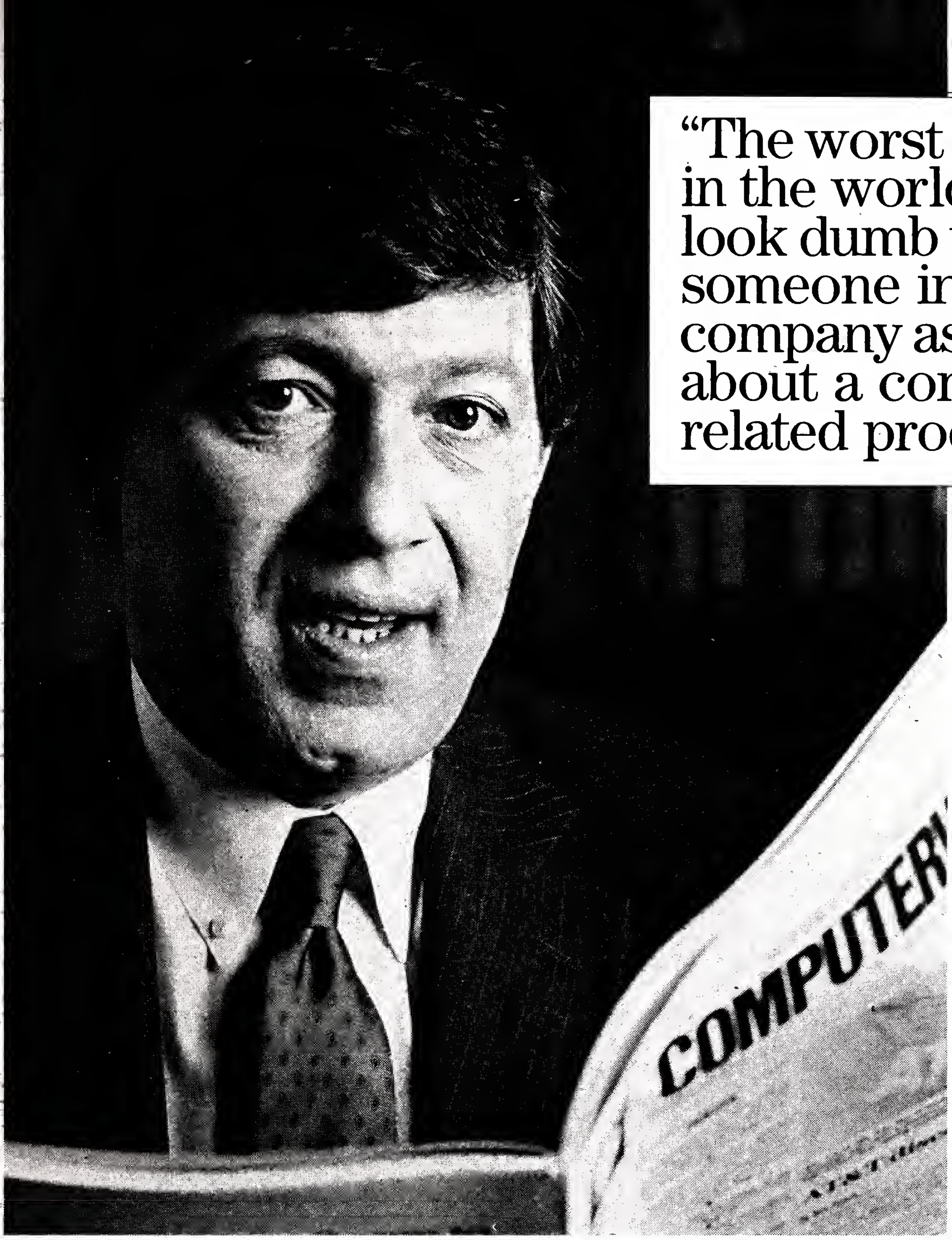

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COMPUTER INDUSTRY

Job dissatisfaction scores high in IEEE-backed survey

BOSTON — Roughly one-quarter of the nearly 2,000 electrical engineers responding to a recent survey said they were dissatisfied with their jobs, and, the survey noted, the problem is greatest with those engineers under the age of 30 earning below $35,000.

The survey, conducted by Louis Harris and Associates for the 250,000-member Institute of Electrical and Electronics Engineers (IEEE), also reported that the engineers' level of job dissatisfaction was nearly twice that of doctors and five times that of lawyers, two professional groups that responded to similar recent surveys.

According to the IEEE survey, 27% of all respondents felt "their career has fallen short of what they had hoped for." An equal percentage felt their careers had exceeded their expectations, and 38% felt their careers have been what they had expected.

Human element ranks higher

When asked what could improve their level of job satisfaction, the respondents listed human factors rather than increases in benefits and pay. The keys to job satisfaction, they said, were creative opportunities, a good working relationship with managers, growth potential and having a good working rapport with peers.

The keys to productivity, they said, were more and better information from management about decisions that affect engineers, giving engineers more say in decisions that affect them and providing a greater chance for recognition and promotion.

Survey results, released last week at the IEEE's international conference here, noted that the respondents were "somewhat critical of nearly all their fellow workers in terms of how many hours they put in, how effective they are and also how creative they are." Management was also scored by most respondents as "less productive and less creative than any other component in the work force."

The respondents who said they were dissatisfied complained most about having to do too much routine paperwork (61%) and not having enough time to attend external meetings and conferences (55%). They rated opportunities for creativity as being among the most important keys to job satisfaction (63%) and said they felt most other electrical engineers they know are just as dissatisfied (63%).

The survey, conducted in part with funding from the National Science Foundation, also found that 70% of the respondents felt that U.S. productivity was either fair (60%) or poor (12%), and that of 10 social issues, their greatest (94%) concern was "the nation's competitive position in world markets." Also rated as high concerns were national politics, technology matters (88%) and the nuclear arms race (86%).

Those who felt most strongly that the U.S. was competitively weak laid the blame on labor unions, but nearly one-third said it was the fault of their manager. Ten percent, meanwhile, said it was the fault of engineers themselves.

"What these data strongly suggest," the report said, "is that productivity must be improved at the company level, rather than mandated at the national level.

"What we can conclude from a review of these profiles," the report noted, "is that the satisfied electrical engineer works in an environment where supervisors set a good example for productivity, where creative opportunities and autonomy are evident, where, in short, good employee relations practices are in force."

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IPL reports revenue dip of 67% plus

WALTHAM, Mass. — IPL Systems, Inc. recently reported a first-quarter loss of $2.7 million, or 54 cents per share, as revenues dipped by more than 67% from the comparable quarter one year ago.

The company said the decline in revenue was due to a realignment of its sales and marketing organization and technical problems that delayed the availability of its model 4480 Continuous Compatible Computer dual processor.

The company also said it has solved those technical problems and began shipping the 4480 during the second quarter.

The losses posted in the first quarter represented a dramatic 366% downward jump from the loss of $580,000, or 5 cents per share, posted a year earlier. IPL reported revenues of only $932,000 for the first quarter, in comparison with $2.89 million one year ago.

The company said the realignment of the sales and marketing groups and the use of a third-party maintenance organization are expected to strengthen its sales efforts.

HP profits up 30% for quarter

PALO ALTO, Calif. — Hewlett-Packard Co. reported that earnings for the second fiscal quarter, ended April 30, rose 30% to $141 million, or 55 cents per share, compared with $109 million, or 43 cents a share, in the same period last year.

Revenues also rose by 30% to $1.5 billion for the period, compared with $1.1 billion a year ago.

Incoming orders in the second quarter amounted to $1.6 billion, a 30% increase over $1.2 billion a year earlier. Domestic orders were $953 million, a 33% rise from a year ago, while international orders gained 25% to reach $656 million, HP said.

All four of HP's business segments showed an increase in orders: computer products (27%); electronic test and measurement (38%); medical electronic equipment (18%); and analytical instrumentation (19%).

HP said its second-quarter expenses, which rose to $268 million from $189 million a year ago, reflected an emphasis on microcomputer items.

Masstor reports losses despite strong sales

SANTA CLARA, Calif. — Masstor Systems Corp. recently reported that first-quarter sales had almost doubled compared with year-earlier results, but that expenses had more than doubled over the same period and so had the company's losses.

The company reported first-quarter revenues of $6.3 million, compared to $3.3 million one year ago. Total expenses, however, zoomed to $11.6 million from the $5.8 million reported in the first quarter of 1983. As a result, the company reported a loss of $5.2 million, or 37 cents per share, for the quarter ended April 1, compared to a loss of $2.5 million, or 32 cents per share, a year earlier.

Erik Salbu, chairman and president, hinted at better days ahead, pointing out that product development "will be at a substantially reduced rate in subsequent quarters, due to completion of several projects in the first quarter. Research and development costs in the first quarter were $2.7 million, double the level of R&D spending one year ago.

Salbu also noted that first-quarter orders from six domestic customers, and a letter of intent from one other, match the total of customers added in all of fiscal 1983.

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Computerland China planned

OAKLAND, Calif. — The next people to "shake hands with the future" may very well be the Chinese.

Computerland Corp. recently announced that William H. Millard, company founder and chairman, signed a letter of intent with officials of the People's Republic of China's Ministry for the Electronics Industry to create a joint venture called Computerland China.

With final details to be worked out during the remainder of the year, the project may be initiated as early as June, with a Beijing exhibit in microcomputer products from a broad range of manufacturers, according to Computerland.

Millard said the company has received U.S. approval to ship a broad selection of products to Beijing for the exhibit this summer. The company will also submit for U.S. government approval a plan to train Chinese technicians who would then train Chinese users.

Packard lauds engineers' contribution to future

By Edward Warner
CW Staff

BOSTON — The next 100 years will see men stationed on the moon and will produce a world of computer chips made by genetically engineered organisms, David Packard told a banquet last week celebrating the 100th birthday of the Institute of Electrical and Electronics Engineers (IEEE).

Packard

That future world, the chief executive officer of Hewlett-Packard Co. told the gathering of about 550 IEEE members, will become a reality in part because of the efforts of electrical engineers. Remarking on the advances of the past century, Parkard said: "I cannot help but be very optimistic about the next century for electrical and electronic engineering."

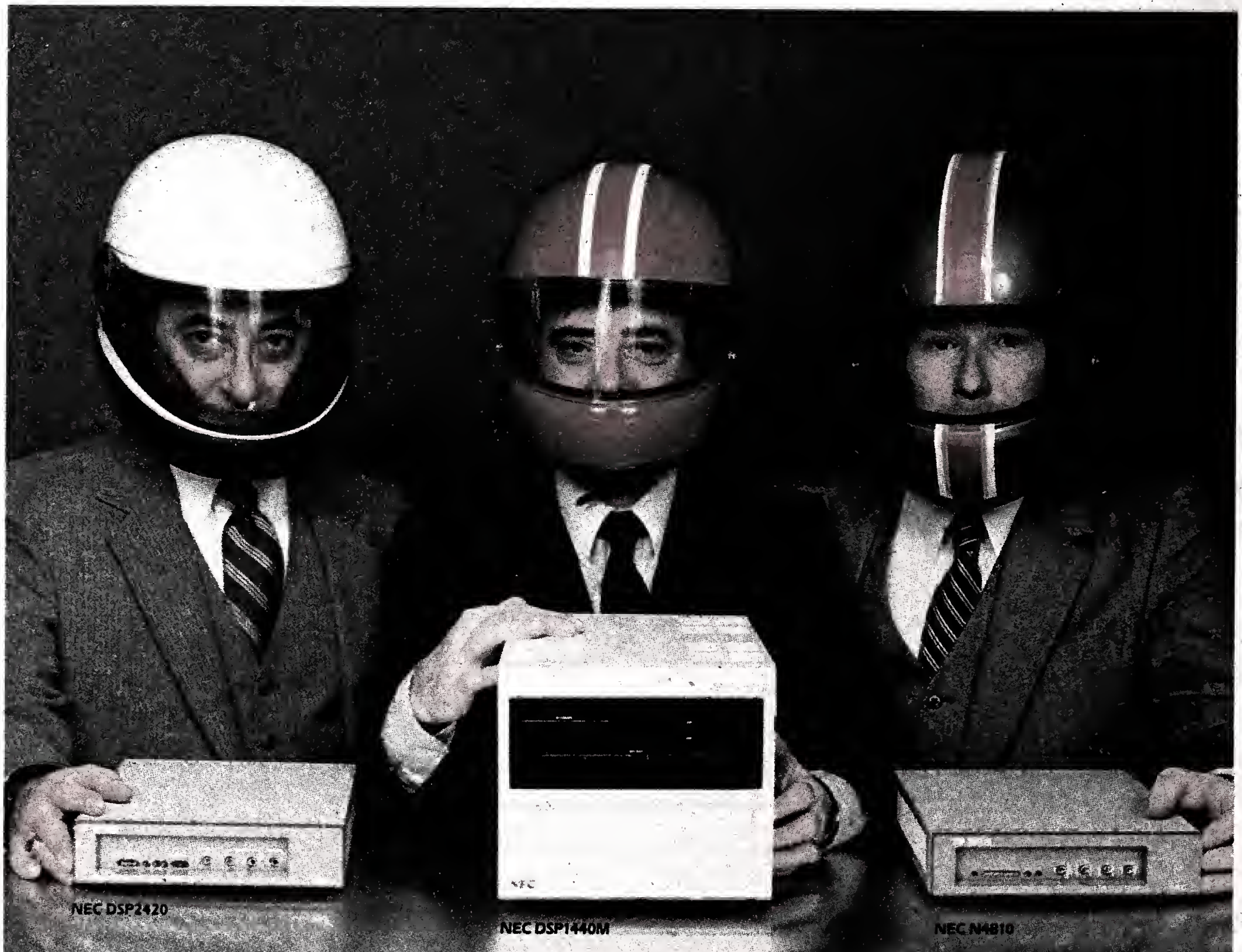
Turning to the present, Packard called "simply stupid" a recent U.S. Department of Defense proposal to censor the reports from academic research projects that it funds. Packard said the proposal, now under consideration by a Defense Department committee, "will do considerable damage to the advancement of all technology in the [U.S.], including technology useful for military purposes." The plan also would fail to meet its goal of stemming the flow of U.S. technological knowledge to the Soviets.

Packard criticized the breakup of AT&T as a great mistake and predicted it will result in "much worse telephone service and higher rates."

Among those in the audience were the chairmen of the boards of AT&T and Texas Instruments, Inc.

An electrical engineer himself, Packard, 73, and Stanford University classmate William R. Hewlett formed their electronics firm in January 1939. Before that, Packard had worked as an engineer with General Electric Co., where he said he had been advised to specialize in designing power generation equipment and to stay away from electronics.

Packard lauded the luminaries of electrical engineering's last century, including George Westinghouse, who first harnessed the hydroelectric power of Niagara Falls, and Cyrus Elwell, a fellow Stanford graduate who developed "the first device that made wireless telephoning possible." He also praised the numerous joint development projects of venture capitalists and inventors, Elwell's work among them. He noted that "despite the criticism we hear, the [U.S.] has somehow provided a more favorable environment for innovation and invention than any other country in the field of electrical and electronic innovation."



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Lichtenberg

Space: a better medium for silicon?

Shuttle experiments may yield bigger, purer silicon crystals

BOSTON — An MIT scientist who spent 11 days in space last year told a gathering of members of the Institute of Electrical and Electronics Engineers here last week of growing a high-quality silicon crystal aboard the space shuttle.

Dr. Byron K. Lichtenburg, one of the two scientists aboard the shuttle's Spacelab 1 research laboratory, said the rod-shaped silicon crystal was produced to determine whether a higher level of silicon purity could be achieved in space than is possible on Earth.

Lichtenburg also predicted that the weightlessness of space might permit much larger gallium-arsenide crystals to be grown than is possible on Earth, a potential boon to the production of what some say is the microprocessor chip-making material of the future.

The results of experiments conducted aboard the $1 billion Spacelab will be released sometime in June, Lichtenburg said.

In all, two trillion bits of scientific data were transmitted back from the mission, he said.

To gain the vacuum needed to grow crystals, he noted, the space scientists linked a tube from the crystal-growing chamber through the walls of their orbiting lab to the vacuum of space.

Data from Spacelab's experiments was given preliminary study on an off-the-shelf Apple Computer, Inc. personal computer augmented by an Odetics, Inc. data recorder, he said.

Asked what it felt like to take off in the shuttle, Lichtenburg, who will fly another shuttle mission in June 1985, replied: "If you can imagine being on a freight train trying to go at the speed of sound, that's about what it feels like."

Software AG names president

RESTON, Va. — Software AG Systems, Inc. recently announced that Stuart J. Miller was elected president and chief executive officer of the company and of its operating subsidiary, Software AG of North America, Inc.

John Norris Maguire, chairman of the board and currently president, will continue as chairman, the company said.

Miller, 44, is presently vice-president, Office Information Systems, with Sperry Corp.'s Computer Systems Division in Blue Bell, Pa.

Two firms ink source contract

SUNNYVALE, Calif. — Signetics Corp. and Motorola Corp. recently announced an alternate-source agreement involving three Signetics VME bus modules and Motorola's MC68010 16/32-bit microprocessor.

Mike Hackworth, Signetics vice-president of the MOS/Linear LSI products group, said the agreement is part of a continuing program of cooperation announced in March 1981, when both companies worked out a program for codevelopment of Motorola's 68000 family of microprocessors and peripheral chips.

Under the terms of the latest agreement, Motorola will alternate-source Signetics SMVME20XX, a single-board computer with the 68010 microprocessor and 68451 memory management unit; the SMVME1500 system controller board; and the SMVME4300 intelligent multiple-disk controller board. Signetics will alternate-source the MC68010 microprocessor, which features a 32-bit internal architecture.

Motorola said it projects supplies of the Signetics board designs will be available in June, while Signetics said it will have samples of the Motorola-designed microprocessor available in the fourth quarter of this year.

The two companies said they anticipate future announcements as further alternate-source agreements are ratified.

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FORECASTS AND FINDINGS

Micro software mart strong

NEW YORK — The microcomputer software market in the U.S. will grow from $1.85 billion in 1983 to approximately $12 billion by 1990 in constant 1983 dollars, according to "Microcomputer Software Distribution."

The 180-page report from Find/SVP, an information and research firm based here, says the key to this explosive growth will be the evolving distribution strategies in the business, education and home markets.

The study forecasts a shakeout in the general application business and home markets. The report, which focuses on evolving distribution patterns and strategies for micro software, is available for $985 from Find/SVP, 500 Fifth Ave., New York, N.Y. 10110.

Federal DP selection criteria

WASHINGTON, D.C. — A report from International Data Corp. details the policies and practices used by U.S. government agencies in the selection of data processing systems.

The report, "Technical Evaluation vs. Cost in the Selection Process," concludes that these policies are often misunderstood and inconsistently applied, resulting in numerous protests.

The report is available for $495 from International Data, Suite 240, 1500 Planning Research Drive, McLean, Va. 22102.

Phone/display units popular

MEDFIELD, Mass. — The U.S. market for integrated telephone/display terminals began to take off in 1983, with shipments of more than 32,000 units valued at more than $43 million, according to a recent report by Advanced Resources Development, Inc.

The study found that the bulk of the market consists of low-end, nonintelligent terminals such as Northern Telecom, Inc.'s Displayphone, Tymshare, Inc.'s Scanset XL and GTE Corp.'s Actionstation.

The study is available for $700 from Advanced Resources Development, 28A Park St. Station, Medfield, Mass. 02052.

Color printer sales to rise

NORWALK, Conn. — The recent widespread adoption of color monitors and color-capable software will drive color printer sales to $4.1 billion in 1993, up from $750 million in 1984, according to a study titled "Color Printers."

The 190-page report from International Resource Development, Inc., a market research firm here, says that an annual growth rate of 18% will be prompted primarily by sales of pen plotters to the scientific/engineering and business communities.

The study costs $1,650 and is available from International Resource Development, 6 Prowitt St., Norwalk, Conn. 06855.

DEC, AT&T, IBM compared

BOSTON — A report compares three different software environments from Digital Equipment Corp., AT&T and IBM in terms of computing power, compatibility with hardware, program development capabilities and network support.

Prepared by the publisher of the industry newsletter, "Monosson on DEC," the report details three operating systems: DEC's VAX/VMS, IBM's VM/CMS and Unix.

The report is available for $150 from Monosson Technology Enterprises, P.O. Box 71, Kenmore Station, Boston, Mass. 02215.

NICKELS AND DIMES

Centronics Data Computer Corp. announced revenues for the first quarter were $39.5 million, compared with $43.7 million a year ago. Net loss for the quarter was $1.9 million, or 17 cents per share, compared with a profit of $204,000, or 2 cents per share, one year ago.

■

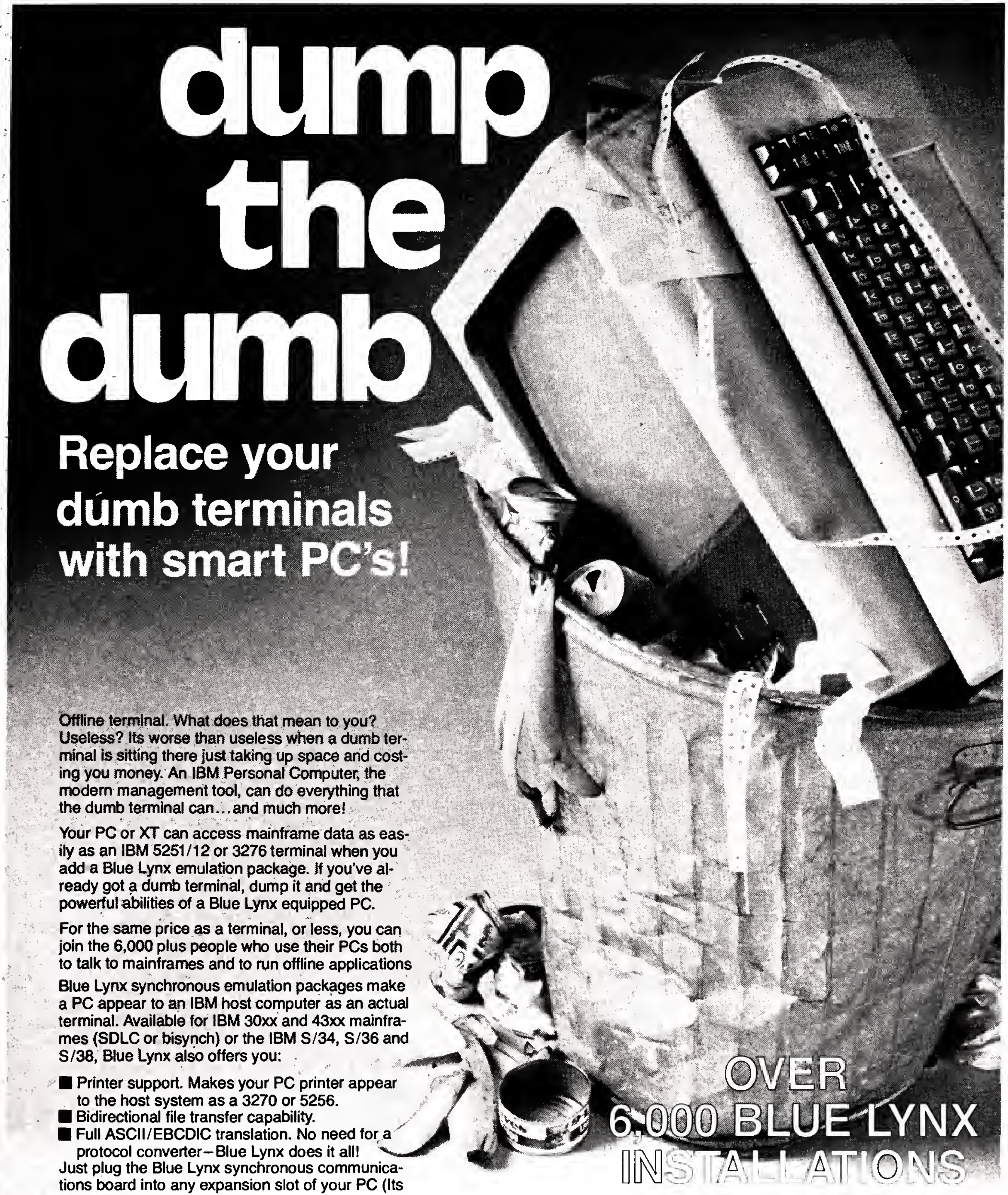
Linear Instruments Corp. reported profits for the quarter ended March 31 were $46,036, or .014 cents per share, compared with a net loss of $41,295, or 1 cent per share, one year earlier. Revenues were $1.09 million, compared with $1.01 million one year ago.

■

Fibronics International, Inc. announced per-share profits for the first quarter ended March 31 of 6 cents, compared with a loss of 1 cent per share one year earlier. Revenues were $2.3 million, compared with $913,157 for the same period in 1983.

■

Data Card Corp. reported profits for the fourth quarter ended March 31 were $2.1 million, or 34 cents per share, compared with $1.8 million, or 29 cents per share, one year ago. Revenues were $24.2 million, compared with $17.8 million for the same period last year. For the fiscal year ended March 31, Data Card said, profits increased 37% to $6.1 million, or 98 cents per share, compared with $4.5 million, or 73 cents per share, one year ago.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COMPUTER INDUSTRY

MERGERS AND ACQUISITIONS

The International Bureau of Software Test, Sunnyvale, Calif., announced the acquisition of **Peripheral Vision Laboratories, Inc.**, Marlboro, Mass. Under the agreement, the California and Massachusetts laboratories will provide complete software testing services. Terms of the sale were not available.

■

The Dun & Bradstreet Corp., New York, announced it has reached an agreement with the board of directors of **Datastream PLC**, London, on terms of an offer through a Dun & Bradstreet subsidiary to acquire Datastream. Dun & Bradstreet will offer £5.5 per share, or about $101 million, for 100% of Datastream's approximately 13.3 million shares of common stock outstanding. The offer will also be applicable to approximately 190,000 shares that may be issued upon exercise of stock options. Datastream shareowners have agreed to sell their shares to a UK subsidiary of Dun & Bradstreet.

■

Analog Devices, Inc. (ADI), Norwood, Mass., announced that its Analog Devices Enterprises Division has increased by $4.5 million its investment in **International Imaging Systems, Inc.**, Milpitas, Calif., by purchasing common stock from a group of its shareholders. According to International Imaging Systems, this greater involvement by ADI will strengthen International Imaging Systems' ability to continue its product and market development efforts and help it keep pace with the growing market for image processing and image understanding.

■

Centurion Computer Corp., Dallas, has been purchased from Electronic Data Systems Corp. by a group that includes Centurion's original owner, Centurion, Inc. Terms of the sale were not available.

■

Casa Grande Mining Co., Calabasas, Calif., announced a merger agreement with **Datafusion Corp.** The merger is scheduled to close on May 30, subject to the shareholders approval and to proxy material being submitted to the Securities & Exchange Commission.

■

Arrays, Inc., Los Angeles, announced a letter of intent with **American Micro Products, Inc.**, Richardson, Texas, for the acquisition of all capital stock of American Micro Products. The proposed acquisition calls for Arrays to issue shares of its common stock, not to exceed 175,000 shares, having a market value at the closing of approximately $1 million. The acquisition is subject to certain conditions, including the execution of a definitive agreement.

■

Varian Associates, Inc., Palo Alto, Calif., announced it has acquired the assets of **Gartek Systems, Inc.**, Sunnyvale, Calif., for an undisclosed amount of cash.

SUPERSHORTS

In a joint venture between **Tallgrass Technologies Corp.** and **Micro Ware**, a Canadian firm, **Tallgrass Technologies Canada** has been formed as the exclusive distributor of Tallgrass products. Also, **Tallgrass Technologies** has signed distribution contracts with **Norsk Marconi A.S.** in Norway, **Owell A.B.** in Sweden and **Data-Helsinki** in Finland. The contract calls for each company to distribute Tallgrass products.

■

M/A-Com, Inc. announced that one of its operating companies, **M/A-Com Linkabit**, has received a $20 million contract from **Schlumberger Technology Corp.** to provide the pilot and initial production phases of the Schlumberger Satellite Network.

■

John A. Venator has been named executive director of the 47,000-member Data Processing Management Association by the group's executive council. Venator had served as acting executive director since September 1983.

■

Sydis, Inc. signed a purchase agreement with **GTE Business Communication Systems, Inc.** for Sydis' Voicestation system and follow-on products, which will be marketed under the name Onmi-Action Office System. The system will be in conjunction with GTE's Omni family of private branch exchanges as well as in add-on applications to customers' current communications systems. This contract spans three years and has a potential value of $142 million over the initial term. It includes annual renewal options for two additional years, valued at $90 million per year.

■

Multi Solutions, Inc. has announced it has signed a license agreement with **Philips Medical Systems, Inc.** to utilize Multi Solutions' S1 operating system for software development. It is expected that in the near future, Philips will also sign a software distribution agreement to utilize the S1 operating system in a Philips product presently under development, which is expected to be marketed in early 1985.

■

Larry Hicks of R. J. Reynolds Tobacco Co. has been elected president of **Software House, Inc.'s** System 1022/1032 Users Group for 1984-85. Other officers elected include **Susan Selhorst**, vice-president; **Pat Farrell**, secretary; **Lynda Jones**, treasurer; **Rhon Buxton**, program coordinator; and **Stuart Renes**, 1032 program coordinator. Now serving as an advisor is past president, **Dave Eastburn**. **Martin Roth** is the vendor's advisor to the users group.

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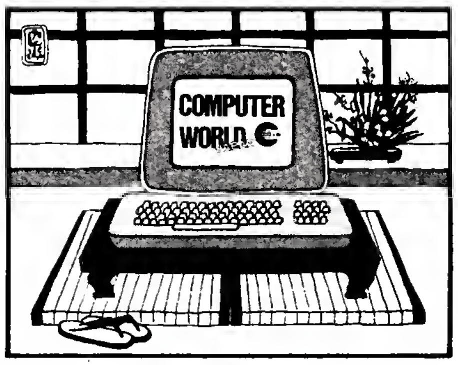

The Japanese computer industry is growing at a rate of 20% per year. There are currenty more than 101,000 installed general purpose computers valued at over $18 billion. This figure does not include minis, micros and personal computers. Small business computers are currently the leading growth sector in the Japanese computer market.

Japan is looking for well-developed technology that will meet their future needs. And with no strong independent software industry of its own, Japan offers great opportunity for U.S. manufacturers in the packaged software market.

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RESELL from page 101

hungry students may be tempted to part with their Macintoshes for a quick several hundred dollars profit.

Already, classified advertisements have reportedly appeared in some campus newspapers offering to buy or sell Macintoshes. But there have been no reports yet of widespread black market dealing, although most consortium schools have received few, if any, machines up to now.

John Collins, a used computer salesman in Rockwall, Texas, said he has already purchased from students and resold 20 to 25 Macintoshes, thanks in part to advertisements he has placed in newspapers across the country. He said he makes from $200 to $300 profit after buying the computers for $1,400 to $1,500.

"I ask the students if they've ever signed an agreement saying they won't resell, and I try not to buy from [those who have]," Collins said. "I don't see how anyone can say it's unfair."

The black market problem comes as no surprise to Apple, according to Burt Cummings, Apple's manager of university sales. "Our point of view is that reselling at some level probably will occur," he said. "Our feeling is that it will not be to any great extent."

But some university officials are taking the problem seriously. Consortium schools are devising various strategies designed to discourage, if not prevent, reselling.

The University of Michigan is requiring students to sign affidavits in which they agree not to resell or lease their Macintoshes for two years. Anyone caught violating the agreement could face a claim of $2,000 damages by the school, said Greg Marks, special assistant to the provost. The school also will conduct spot surveys of buyers to see if they still own their machines.

"We have been very careful to make sure that this is the type of agreement that is enforceable," Marks said, noting that the school intends to prosecute violators.

Harvard University officials have decided not to sell the Macintoshes directly to students, but rather to give them a 15-month lease. Students will not actually own the machines until the 15 months are up, said Paul Martin, dean of the division of applied science.

The University of Chicago has taken a different approach. Students and faculty sign nonbinding statements saying they understand the Macintoshes are to be used for university purposes only and not resold. No disciplinary actions are contained in the statement, said George Bateman, assistant director of the university's computation center.

"We're going to remain optimistic that the program will not be abused by students and faculty," Bateman said. He added that the university does plan to watch local newspapers' classified advertisements to spot anyone offering a Macintosh for sale. The university will attempt to contact the seller to determine if he is a student or staff member.

Drexel University in Philadelphia is unique among consortium schools in requiring all incoming freshmen to own or have easy access to a Macintosh.

The school already has some 2,000 Macintoshes in use by students and staff.

Because of that requirement, Drexel officials are not very concerned about students reselling the machines, said university spokesman Eric Rosenthal. "At Drexel, the Macintosh is a required academic tool," he said. "A student would virtually be committing academic suicide to be without one."

APPLE from page 101

sortium members.

Cummings noted that Apple isn't the first vendor to offer substantial discounts and donations to colleges — IBM and Digital Equipment Corp. have been doing so for some time. Said the ACR's Johnson, "IBM and Apple are competing desperately to get into the universities to guarantee their future sales as well as to help their technological development."

Despite some strained relationships with its dealers, Apple said it remains committed to the program. "We don't regret doing it," Cummings said.

BILL from page 101

speedy resolution to these differences." He said he expected a compromise bill could become law before the end of the year.

Noting the increasing use of electronics in the U.S., Mathias said passage of this legislation may eventually be considered "one of the more significant achievements of the 98th Congress."

In his view, he said, "the Senate's passage of this bill is a momentous event. It marks our recognition of the importance to our economy and to our society of the continued technological progress in the field of microelectronics."

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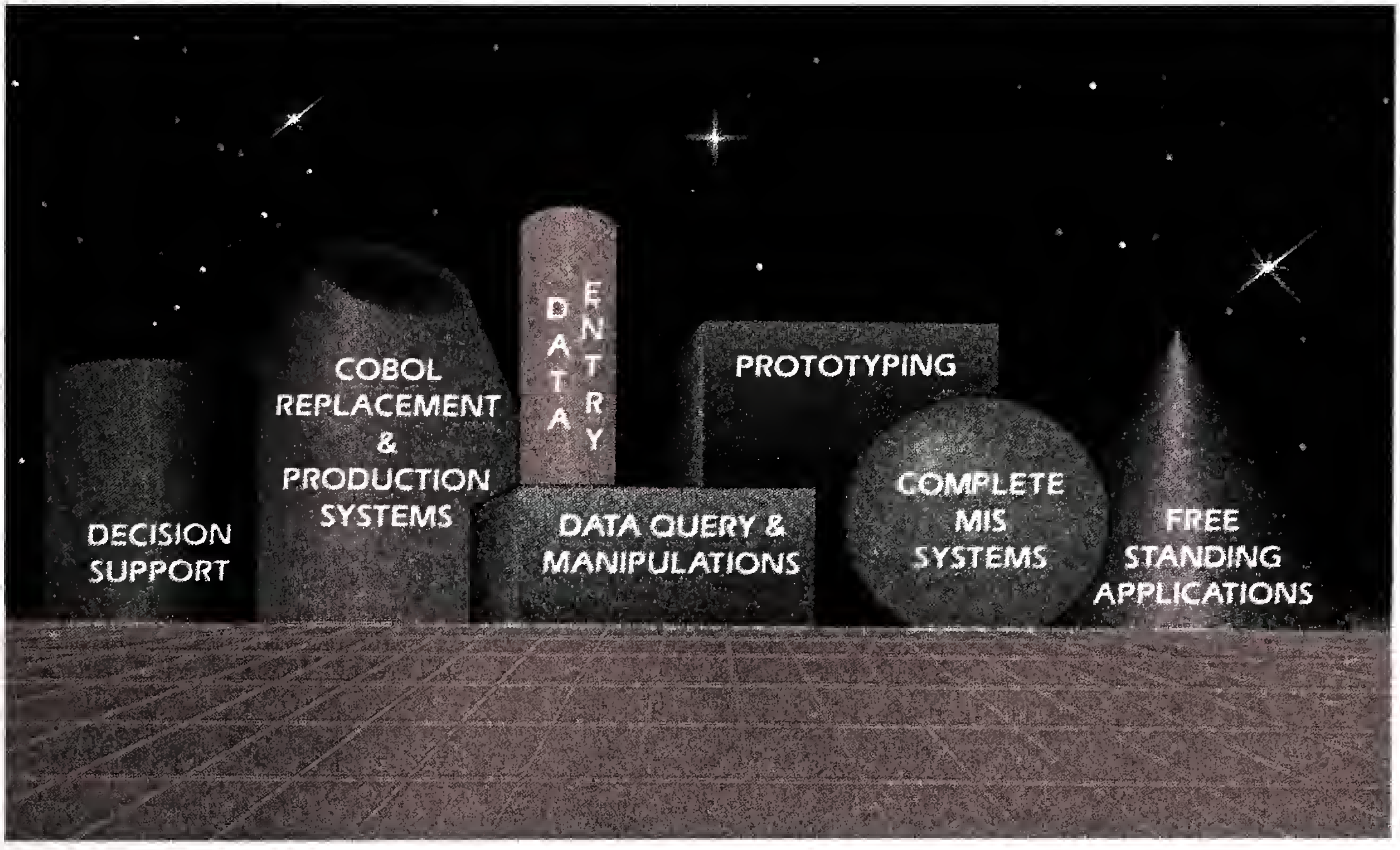
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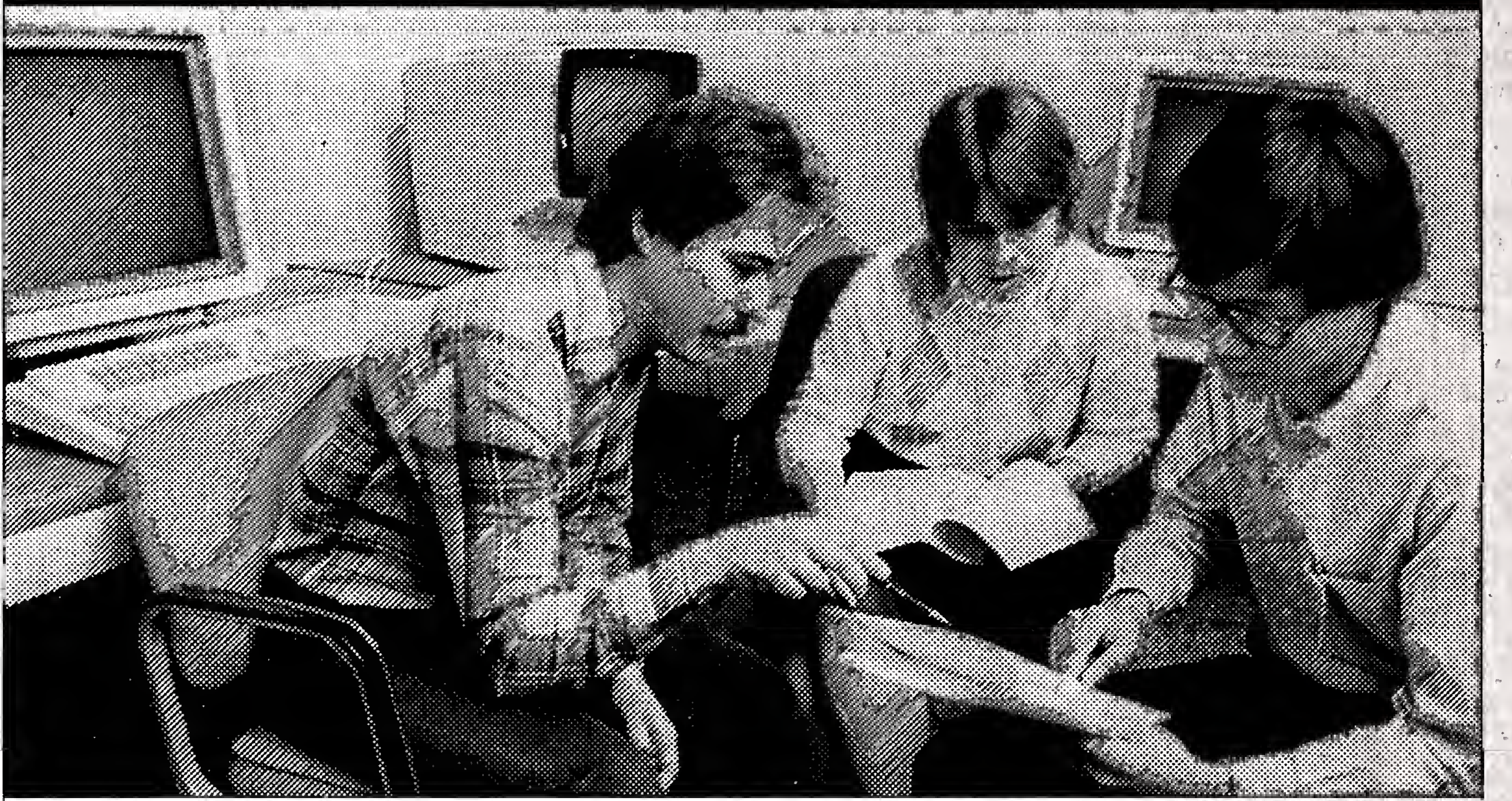
The Technology Designers



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SOFTWARE - MVS-SP1, ACF VTAM, NCP, TSO/SPF, CICS, VS/COBOL, VS/FORTRAN, RACF

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Position requires a minimum of one to two years experience in installation and maintenance of VM/SP and related products including RSCS, APL, ADRS, GDDM, PROFS and ISPF. Assembly Language coding is desirable and knowledge of SSX/VSE or other guests systems running under VM would be a plus. Experience is not required in all areas.

HARDWARE - IBM 43 XX, 3370, 3274, 6670
SOFTWARE - VM/SP, APL, GDDM, PROFS, ISPF, SSX/VSE

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Position requires experience as an IMS applications programmer using COBOL plus two years experience as an IMS/VS system programmer with proficiency in the following areas: Installation, SYSGEN, Maintenance, Problem Determination, Debugging, Performance Measurement and Tuning, OS JCL, SMP4.

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Important Software Selling Traits:
"Three of the most important traits I look for in sales candidates are perception, integrity, and determination. Perception gives a salesperson the ability to understand what the customer's needs are and which software can most effectively solve those needs. Integrity is important because it's at the very heart of everything Cincom holds dear. And thirdly, I think every good salesperson should be very determined."

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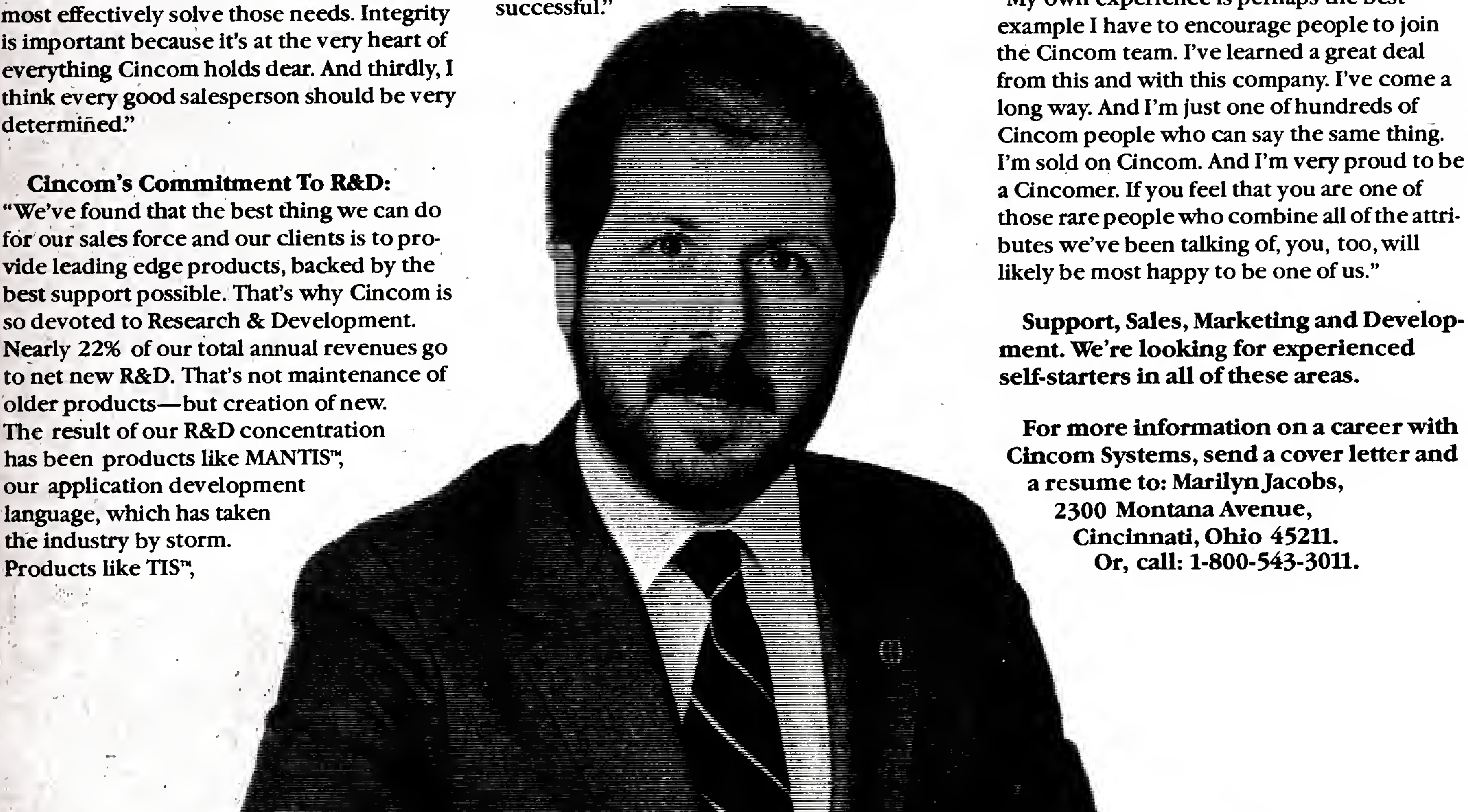

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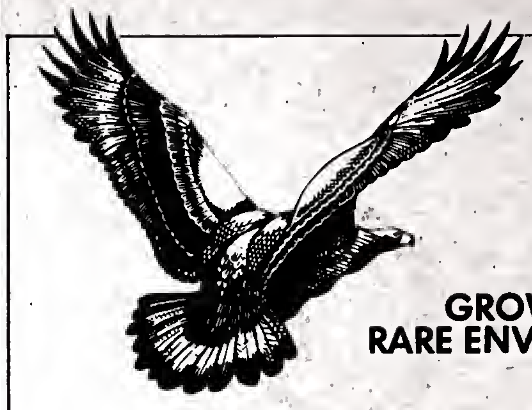

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ATE SOFTWARE ENGINEERS

- Will design, davelop, test and document software for the FSE/DSE. The basic software elements to be developed include station selftest, station calibration and station fault isolation. The candidate will use structured techniques for software development and participate in the design and code walkthroughs. A minimum of 7 years in the area of software development with emphasis on ATE software, a BS Degree in Computer Science or related areas and knowledge of FORTRAN and assembly is required. An MS preferred.
- Will design, develop, test and document station selftest software. The candidate will also develop quality test methodology and implement them in order to verify and validate the station selftest software. Will also present the development process (design, code and test descriptions) to the customer and will interface with the test equipment designers to ensure that the sefltest software meets contractual needs. A minimum of 10 years in developing ATE software or related area and knowledge of ATLAS is helpful. A BS Degree in Computer Science or related area and knowledge in FORTRAN and assembly required. An MS preferred.

SOFTWARE SUPPORT ENGINEERS

Will design and develop software for the engineering evaluating tests. The position will involve understanding the test requirements and designing new and/or updating existing UUT software to meet the needs of the test. Some maintenance support and documentation effort will be required as a part of the job. Experience in a real-time environment with systems background preferred but not required. A BS Degree in Computer Science or related area and knowledge of FORTRAN and assembly required. MS preferred.

SOFTWARE SYSTEMS ANALYST

- Will be the nucleus for building the real-time software for the depot support equipment and the MOD AIRS program. Will also provide the software engineering technology base which includes implementing a standard applicable to each specific product and support management in the decision making process. An advanced degree in computer science, complete familiarity with software engineering as it applies to real-time software with emphasis on testability; thorough understanding of real-time systems.
- Will design and develop software for the AINS program. The candidate will interface with Honeywell and understand the requirements, test their feasibility, develop a high level design and manage technical team to complement the software.

SOFTWARE TECHNICAL WRITER

Will function as a technical writer to develop documentation in accordance with Military Standard 483. Duties will include coordinating the requirements and developing a requirements document, coordinating and developing a design document, user's guide and supporting software reviews. 3+ years experience in the area of documentation and software development and a BS Degree in Engineering with emphasis on computer science and knowledge of FORTRAN and assembly language is required.

SOFTWARE ENGINEERS

- Will develop the UUT software for the FSE/DSE program. You will also review requirements, design, code and test software, as well as document the software in accordance with MIL-STD-483 and participate in both inhouse reviews and formal presentation with the customer. You will also be required to interface with the systems engineers in defining software requirements. A minimum of 7 years in real-time software development, a BS Degree in Computer Science or related area and knowledge in FORTRAN and assembly is required. MS preferred.
- Will design, code and test real-time software in the area of UUT (Unit Under Test) diagnostics. Duties will also include documenting the software and participating in both in-house reviews and reviews with the customer. 3+ years in the area of real-time software, a BS Degree in Computer Science and knowledge of a high order language and assembly language is required. MS preferred.

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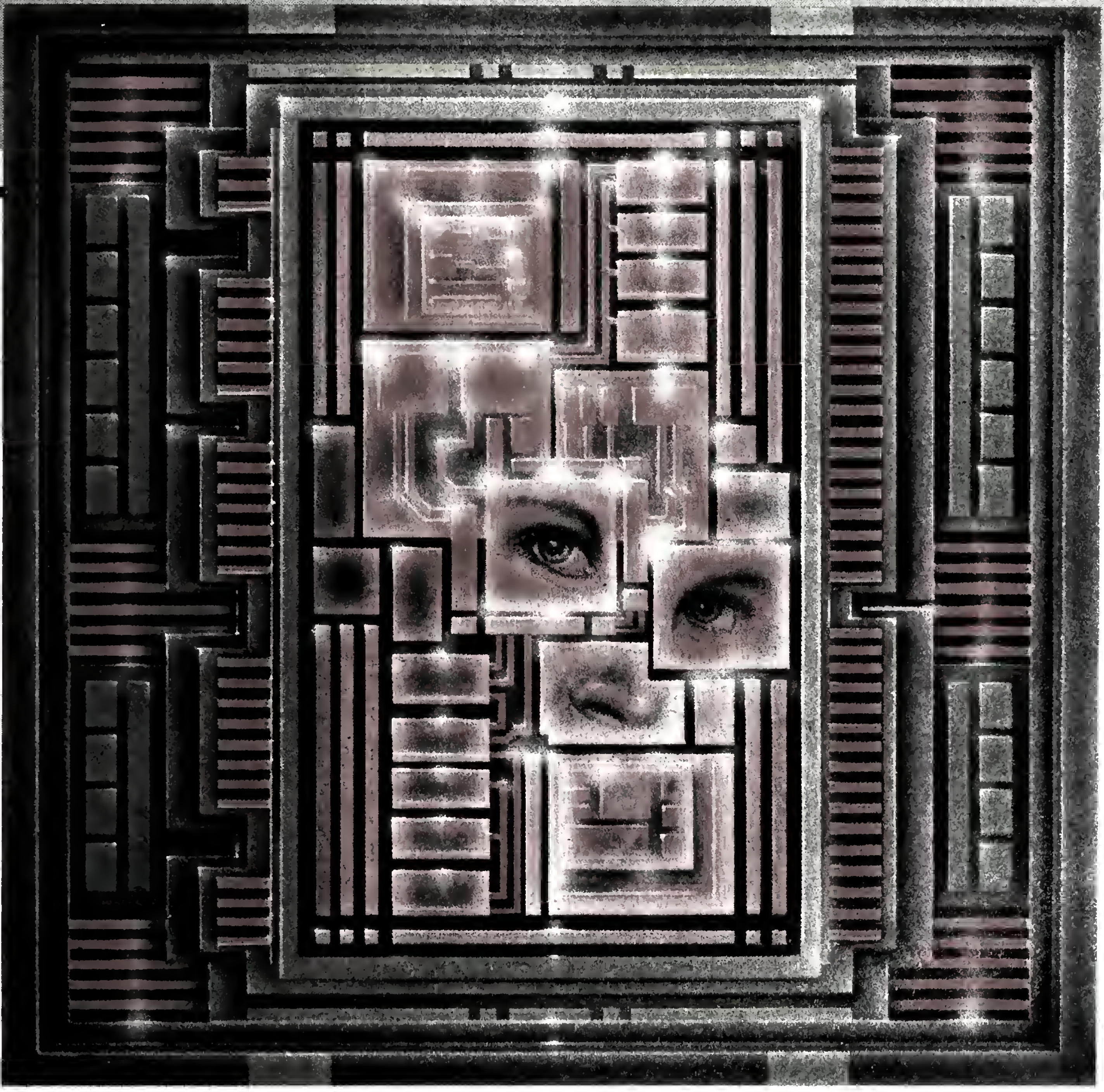

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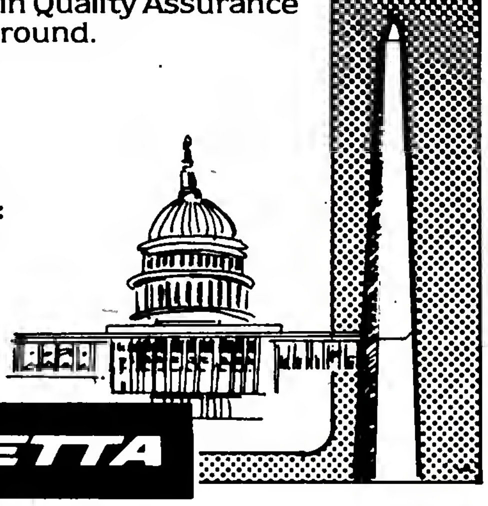

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CSIRONET

RESEARCH SCIENTISTS

(3 POSITIONS)

(A$25,342 — A$37,274)

LOCATION: CANBERRA, AUSTRALIA

THE ORGANIZATION:

CSIRO conducts scientific and technological research in laboratories located throughout Australia and employs about 7,500 staff, of whom some 2,900 are professional scientists. The Organization's research activities are grouped into five Institutes: Animal and Food Sciences, Biological Resources, Energy and Earth Resources, Industrial Technology and Physical Sciences.

CSIRONET is an Australia-wide computer network providing advanced computing facilities to CSIRO, government, tertiary institutions, and industry. Major host computers include a CDC Cyber 76 (scheduled to be decommissioned in 1985), a Facom M-190, a Facom M-180II-AD, and a CDC 835. Services are offered using the CDC Scope 2 and NOS 2 operating systems, and the Facom OSIV/F4 system. A CDC Cyber 205 with VSOS is currently being installed.

As part of its role in providing an advanced computing facility, CSIRONET undertakes development projects in Operating Systems, Computer Communications, Image Processing and Graphics, Information Systems and Software Technology.

The three positions available have been established primarily to undertake research, development and support activities in the following project areas:

DATABASE SYSTEMS

(POSITION NO. A1905)

Under broad direction, responsible for the development of database facilities on CSIRONET, including the use of available systems for the management of text and formatted databases. In addition the successful candidate should be capable of developing advanced systems in one or more areas such as spatial databases, distributed databases or office automation. Experience with database system technology is essential.

COMPUTER COMMUNICATIONS

(POSITION NO. A1926)

Under broad direction, responsible for the design and development of high-level communications facilities supporting distributed applications. Experience in computing networking, and familiarity with the Open Systems Interconnection standards development activities are highly desirable. Consideration may be given to locating the successful applicant in Melbourne.

COMPUTER GRAPHICS

(POSITION NO. A1906)

Under broad direction, responsible for the development of graphics facilities on CSIRONET, and for projects on scientific data display techniques. Experience with techniques for the display of 2 and 3 dimensional data particularly on colour raster display systems is desirable. An understanding of graphics standards efforts and of the support of graphics devices in a network environment is also desirable.

QUALIFICATIONS: Applicants should possess a PhD degree, or equivalent qualifications, in Computing, Information Science or a related field, together with previous research experience in the relevant field.

TENURE: All appointments are for an indefinite period, however applications will be considered from persons interested in a 3 to 5 year term appointment. Australian Government Superannuation Benefits are available.

RELOCATION EXPENSES: Conditions include substantial assistance towards the cost of fares and removal expenses.

APPLICATION: All applications will be treated in strict confidence. They must be in writing, marked 'CONFIDENTIAL', quoting the relevant reference number, giving full particulars of background, experience and qualifications and including the names of at least two professional referees and should be directed to:

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GPO Box 1800, CANBERRA ACT 2601,
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Sys. Prog. (3 yrs NCP & VTAM)	to $40,000 FL location
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POSITION DESCRIPTION

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KNOWLEDGE AND SKILLS REQUIRED

A Bachelors Degree is required, supplemented by either a Masters Degree and/or extensive experience in an integrated area of Business and Data Processing. Entry level at either Instructor or Assistant Professor, depending on experience.

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CLOSING DATE

June 1, 1984

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BUSINESS SYSTEMS ANALYST

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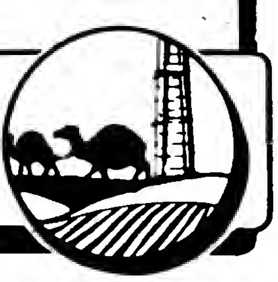

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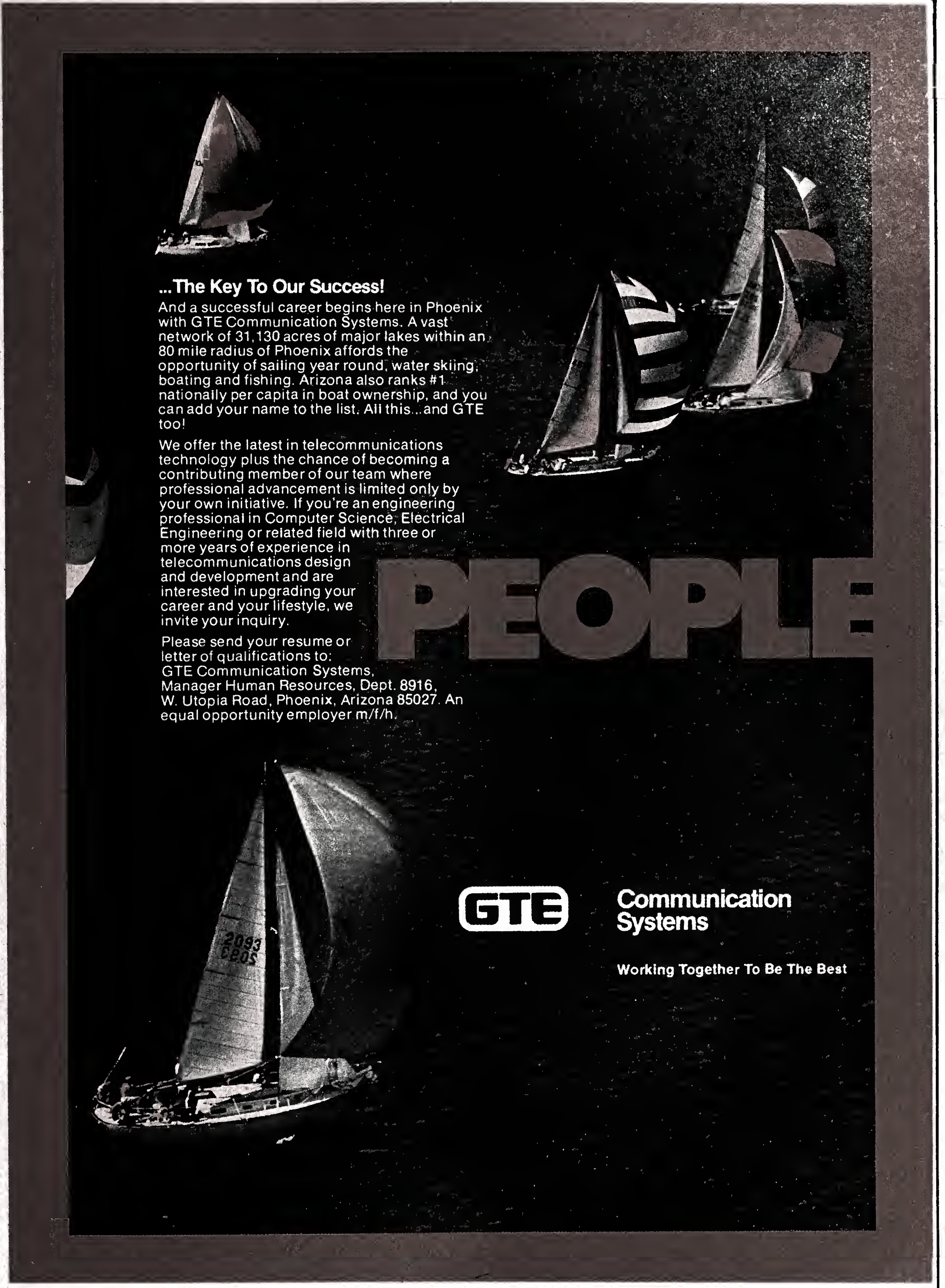

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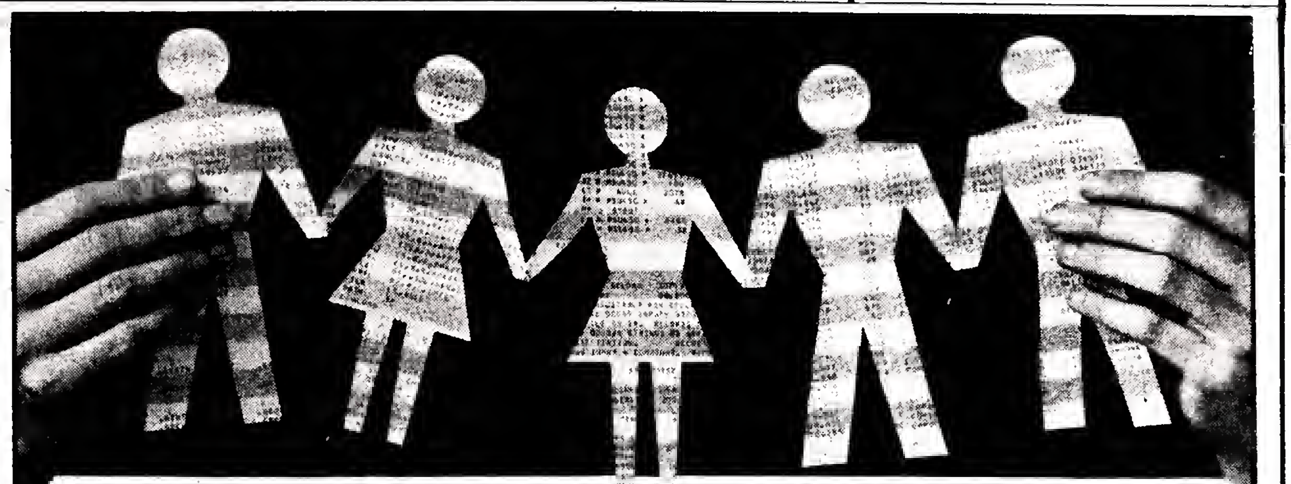

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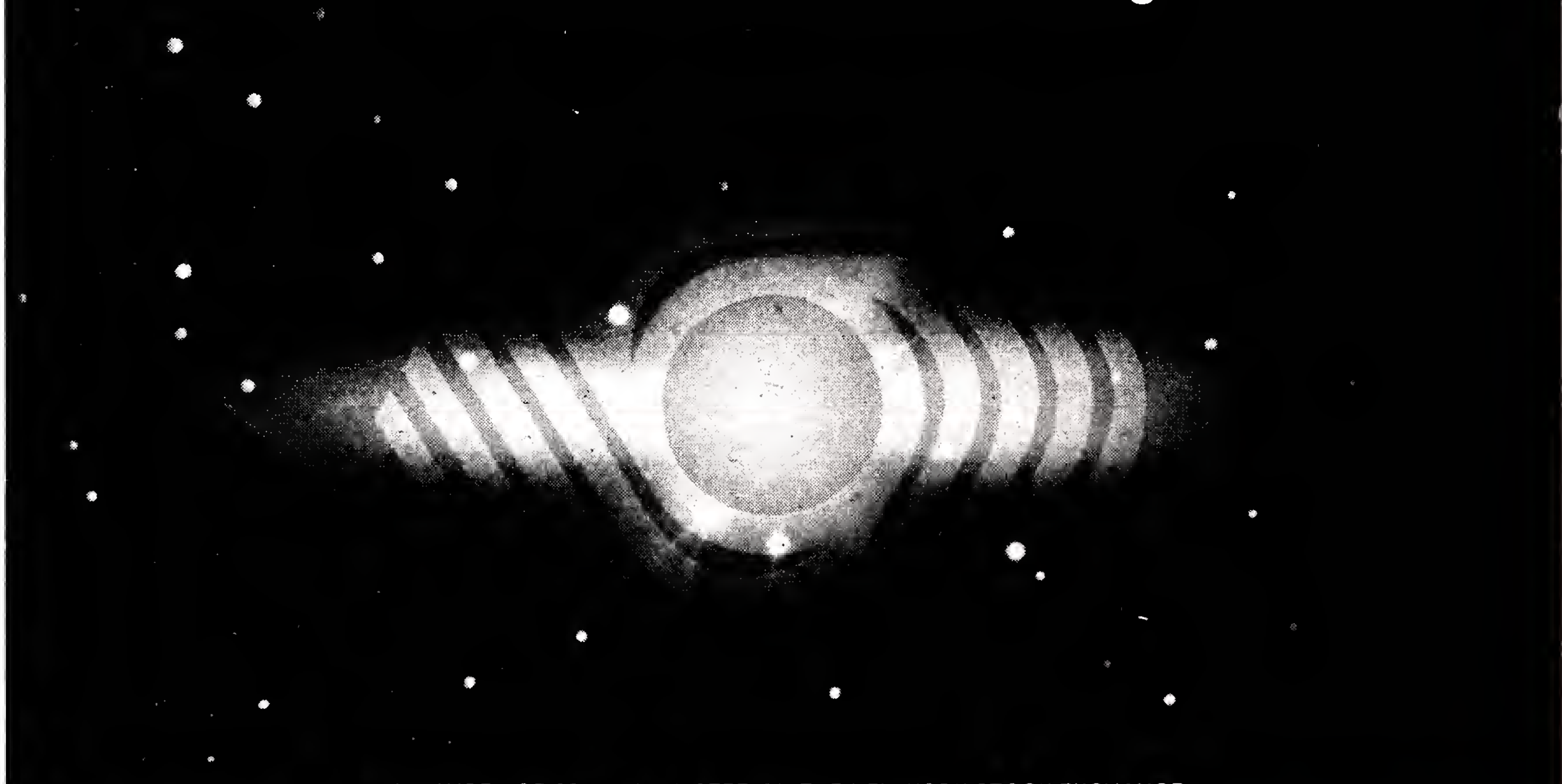

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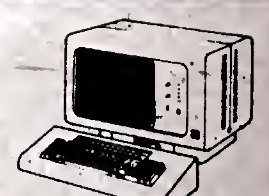

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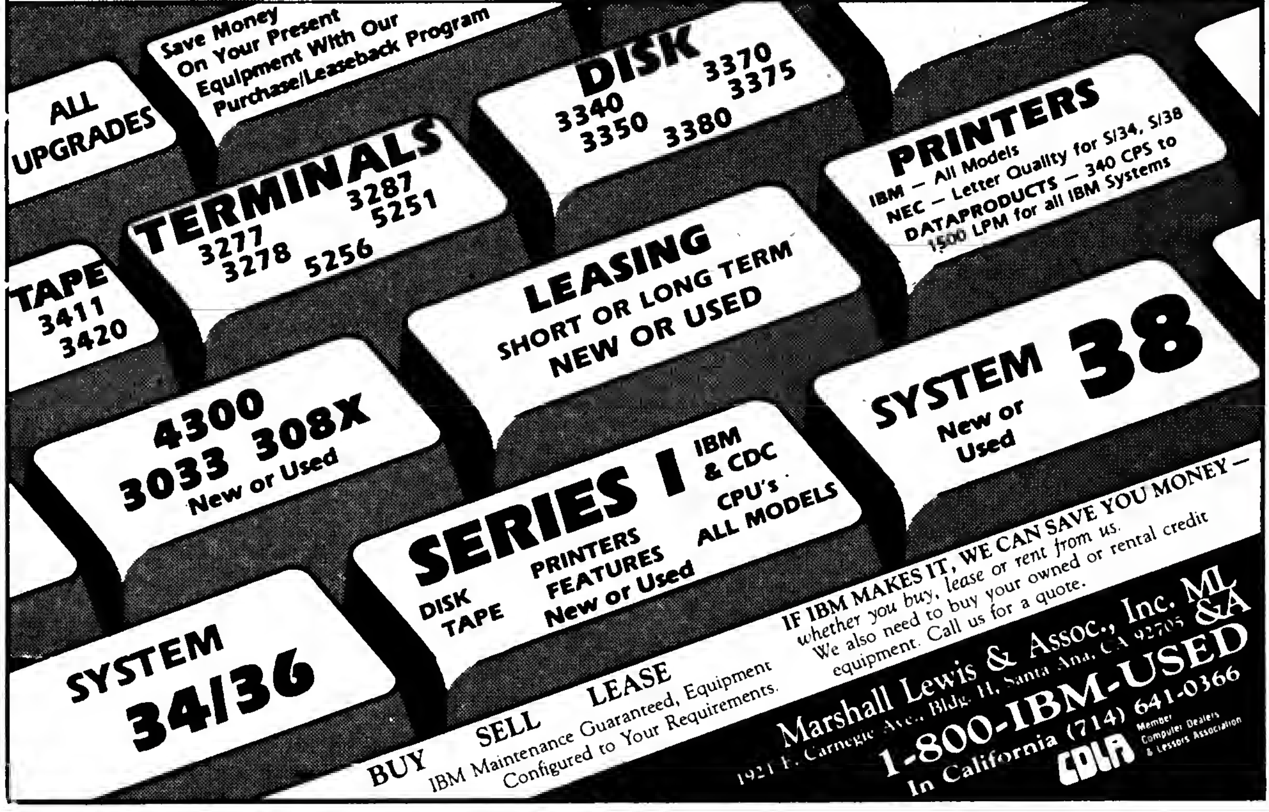
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General Request for Proposal No. 923, due 3:30 p.m., Thursday, June 28, 1984. This is a general RFP for the acquisition of communicating electronic typewriters for the State of Mississippi through June of 1985.

General Request for Proposal No. 924, due 3:30 p.m., Thursday, June 28, 1984. This is a general RFP for the acquisition of standalone word processing systems for the State of Mississippi through June of 1985.

General Request for Proposal No. 925, due 3:30 p.m., Thursday, June 28, 1984. This is a general RFP for the acquisition of shared logic word processing systems for the State of Mississippi through June of 1985.

General Request for Proposal No. 926, due 3:30 p.m., Thursday, June 28, 1984. This is a general RFP for the acquisition of Shared Data Network Services/Equipment for the State of Mississippi through June of 1985.

General Request for Proposal No. 927, due 3:30 p.m., Thursday, June 28, 1984. This is a general RFP for the acquisition of new or used video terminals, printers, and related peripheral equipment which is compatible with IBM's System/34, System/36, and System/38. This general RFP is to be used to select System/34, System/36, and System/38 compatible equipment for the State of Mississippi through June, 1985.

General Request for Proposal No. 928, due 3:30 p.m., Thursday, June 28, 1984. This is a general RFP for the acquisition of video display terminals, printers, and miscellaneous peripheral equipment utilizing Burroughs Poll Select Protocol. This general RFP is to be used to select Burroughs-compatible equipment for the State of Mississippi through June, 1985.

General Request for Proposal No. 929, due 3:30 p.m., Thursday, June 28, 1984. This is a general RFP for the acquisition of UNIVAC compatible CRT's, printers, controllers and multiplexors. This general RFP is to be used to select equipment for the State of Mississippi through June, 1985.

Request for Proposal No. 930, due 3:30 p.m., Tuesday, June 26, 1984, for the acquisition of a distributed processing system capable of performing concurrent word processing, data entry, local data processing, RJE, TSO, and CICS capabilities for the Mississippi Department of Economic Development.

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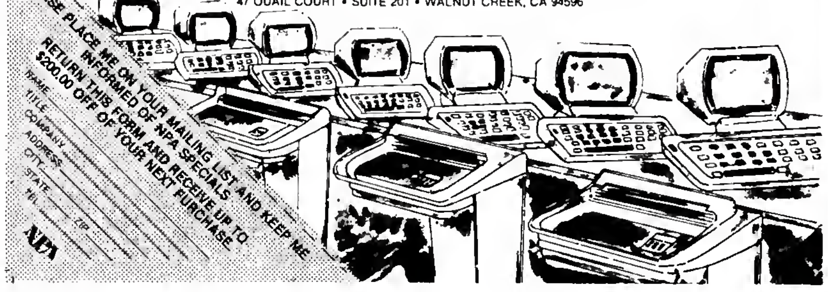

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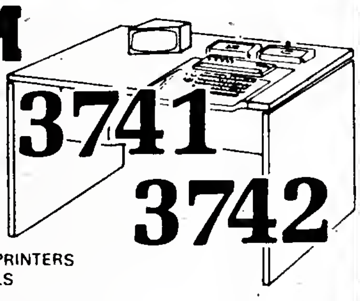

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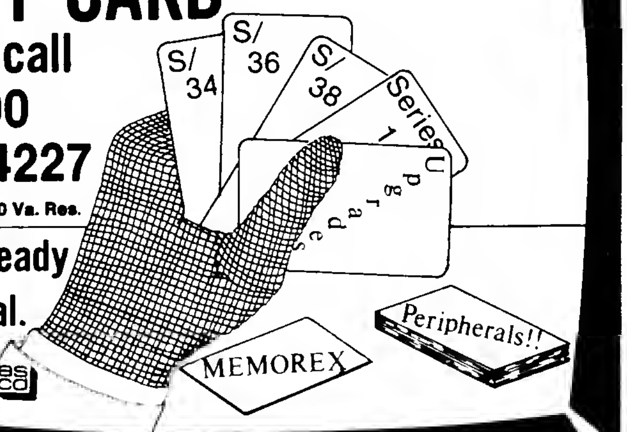

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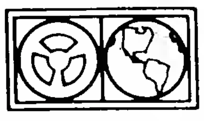

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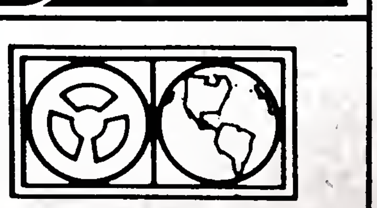

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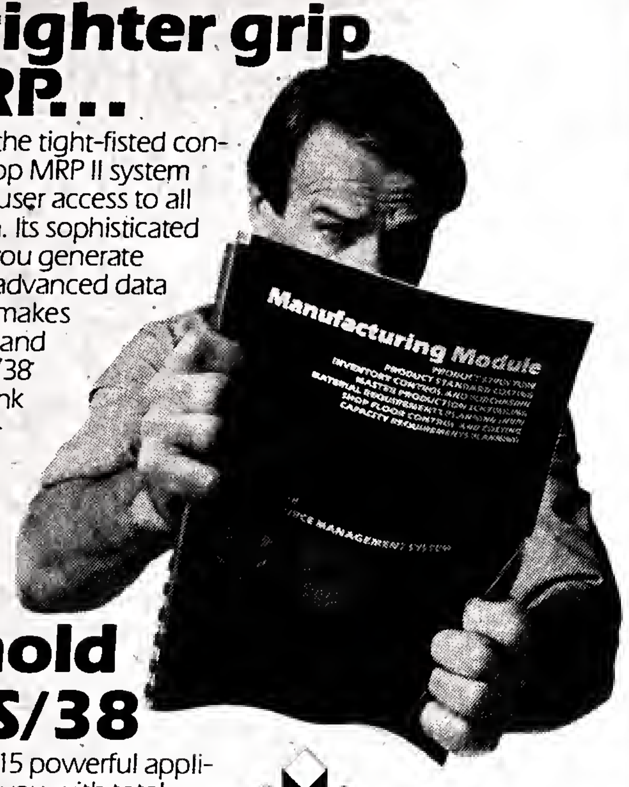

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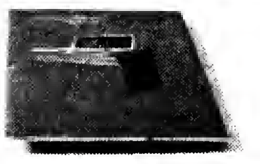

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Michael F. Kelleher
Sales Assistant/Alice Longley
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District Managers/Arthur Kossack, Russ Gerches
Sales Assistant/Jean F. Broderick
COMPUTERWORLD, 2600 South River Road, Suite 304,
Des Plaines, IL 60018

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Senior District Manager/Doug Cheney
District Managers/Ray Corbin, Joan Daly, Fred Lo Sapio
Sales Assistant/Gale M. Paterno
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140 Route 17 North, Paramus, NJ 07652

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District Manager/Bernie Hockswender
Western Regional Director/William J. Healey
COMPUTERWORLD, 18008 Sky Park Circle, Suite 260,
Irvine, CA 92714

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Computerworld Headquarters: 375 Cochituate Road, P.O. Box 880, Framingham, MA 01701
Phone: (617) 879-0700, Telex: 95-1153.

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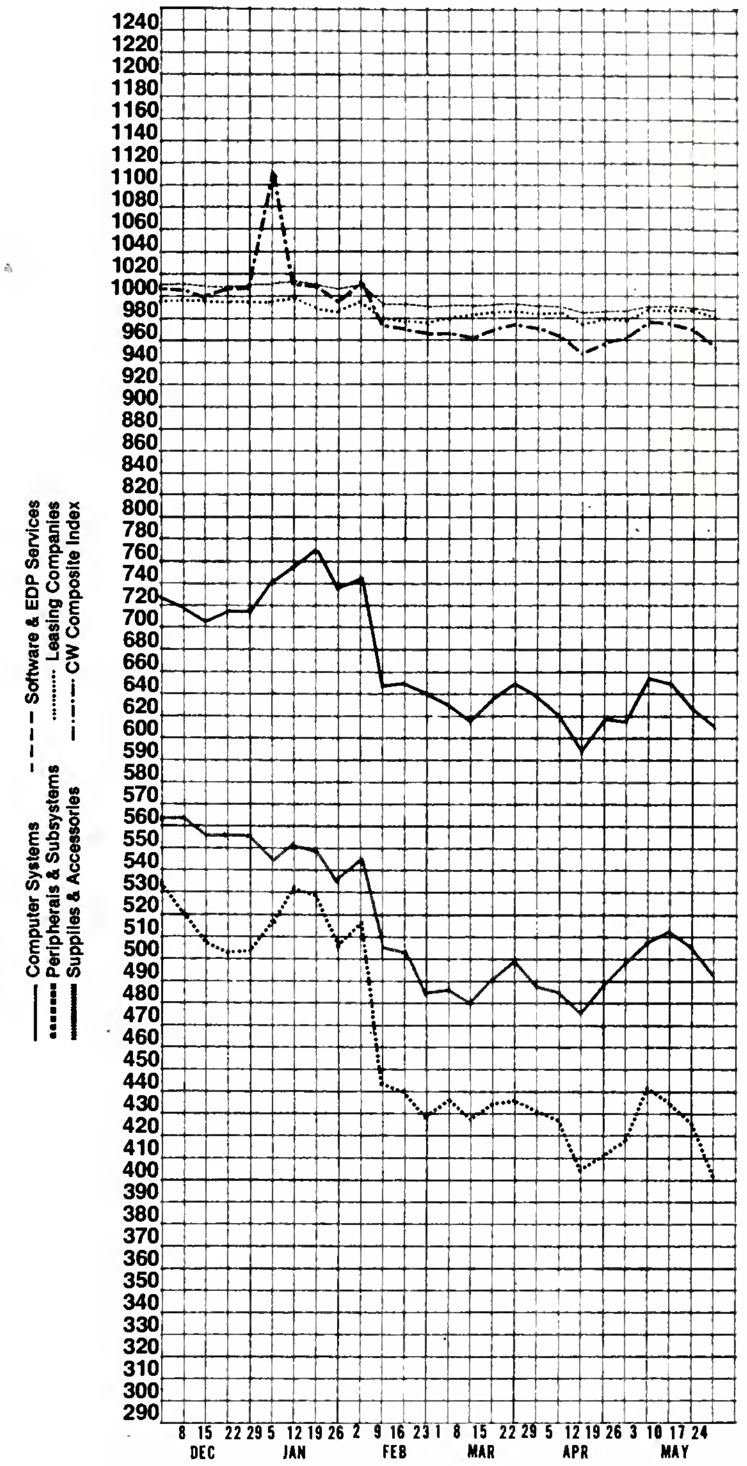
Computerworld Stock Trading Index



Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MAY 23, 1984

All statistics compiled, computed and formatted by
TRADE QUOTES, INC
Cambridge, Mass 02139

COMPUTER SYSTEMS

EXCH		PRICE 1983-84 RANGE (1)	CLOSE MAY 23 1984	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALPHA MICROSYSTEMS	11- 24	12 1/4	-1 1/4	-9.2
O	ALTOS COMPUTER SYST	8- 28	10	-1 1/2	-13.0
A	AMDAHL CORP	9- 30	12 5/8	- 3/4	-5.6
O	APPLE COMPUTER INC	18- 83	30 1/4	- 1/4	-0.8
N	AT&T	15- 70	15 3/4	- 1/8	-0.7
N	BURROUGHS CORP	28- 58	49 7/8	-2 3/4	-5.2
O	COMPUTER AUTOMATION	6- 17	6 3/4	0	0.0
A	COMPUTER CONSOLES	8- 26	18 1/8	- 3/8	-2.0
N	CONTROL DATA CORP	21- 62	30 5/8	-1 1/4	-3.9
O	CONVERGENT TECHNOL	13- 41	13 1/2	-2 7/8	-17.5
N	CRAY RESEARCH INC	20- 58	40 3/8	-3 7/8	-8.7
N	DATA GENERAL CORP	10- 49	43 5/8	-2 3/8	-5.1
N	DATAPOINT CORP	11- 36	22 3/4	- 1/8	-0.5
N	DIGITAL EQUIPMENT	62-132	87 7/8	-3 5/8	-3.9
A	EECO INC	6- 16	13 1/2	- 1/2	-3.5
N	ELECTRONIC ASSOC.	5- 15	5 1/4	- 1/2	-8.6
N	FLOATING POINT SYST	13- 44	15	- 7/8	-5.5
N	FOXBORO	22- 47	31 7/8	-1 1/8	-3.4
O	GENERAL AUTOMATION	3- 16	10 1/4	-2	-16.3
N	GOULD INC	25- 44	25 1/2	-1 1/2	-5.5
N	HARRIS CORP	20- 51	27 3/4	-2 7/8	-9.3
N	HEWLETT-PACKARD CO	22- 48	33 5/8	-2 1/8	-5.9
N	HONEYWELL INC	28- 69	48 5/8	-5 3/4	-10.5
N	IBM	57-134	107 5/8	-4 3/8	-3.9
O	IPL SYSTEMS INC	4- 14	4 1/2	- 1/2	-10.0
N	M/A-COM INC	13- 35	16 5/8	0	0.0
N	MANAGEMENT ASSIST	7- 26	24 1/8	+ 1/4	+1.0
N	MATSUSHITA ELEC(ADR)	47- 88	73 3/8	-4 3/4	-6.0
N	MODULAR COMPUTER SYS	6- 16	7 1/4	- 1/8	-1.6
N	MOHAWK DATA SCI	9- 19	10 5/8	-1	-8.8
N	MOTOROLA INC	82-148	106 5/8	-10 7/8	-9.2
N	NAT'L SEMICONDUCTOR	13- 60	13 3/4	-1 1/4	-8.3
N	NBI INC	17- 51	21	-1 1/4	-5.6
N	NCR	10- 34	26	0	0.0
N	PERKIN-ELMER	17- 37	20 7/8	-1 5/8	-7.2
N	PRIME COMPUTER INC	11- 30	13 1/8	0	0.0
N	SPERRY CORP	21- 50	38	- 3/8	-0.9
O	TANDEM COMPUTERS INC	14- 40	19 3/4	-2 1/4	-10.2
N	TANDY CORP	27- 65	27 3/8	-1 7/8	-6.4
O	TELEVIDEO SYSTEMS	8- 41	7 3/4	- 1/2	-6.0
O	TELXON CORP	8- 16	9 1/4	- 1/2	-5.1
N	TEXAS INSTRUMENTS	71-176	137 1/2	-5 1/4	-3.6
A	ULTIMATE CORP	8- 24	17 1/2	-1 5/8	-8.4
O	VECTOR GRAPHICS INC	1- 14	1 1/8	- 1/8	-10.0
A	WANG LABS "B"	13- 42	25	-1 5/8	-6.1
A	WANG LABS "C"	11- 42	25 7/8	- 7/8	-3.2
N	XEROX CORP	35- 52	38	-1 3/4	-4.4

LEASING COMPANIES

EXCH		PRICE 1983-84 RANGE (1)	CLOSE MAY 23 1984	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	6- 21	19 1/2	- 1/4	-1.2
N	COMDISCO INC.	7- 42	12 3/8	- 3/4	-5.7
O	CONTINENTAL INFO SYS	3- 16	7 1/4	- 3/4	-9.3
N	DPF INC	5- 15	12 7/8	- 5/8	-4.6
O	PHOENIX AMERICAN INC	8- 17	7 3/4	0	0.0
O	SELECTERM INC	11- 21	14	0	0.0
N	U.S. LEASING	18- 47	31 1/2	-2	-5.9

COMPONENTS

EXCH		PRICE 1983-84 RANGE (1)	CLOSE MAY 23 1984	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADVANCED MICRO DEV	13- 37	30 7/8	-2 1/8	-6.4
O	ADV'D SEMICONDUCTOR	12- 38	21 3/4	-3	-12.1
N	ANALOG DEVICES INC	14- 32	20	0	0.0
O	ANALOGIC CORP	14- 27	14 1/4	-1 1/4	-8.0
N	APPLIED MAGNETICS CP	15- 37	15 5/8	-4 1/8	-20.8
N	TERADYNE	14- 39	26	-2	-7.1

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON;
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1983-84 RANGE (1)	CLOSE MAY 23 1984	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 8	2 3/4	- 1/4	-8.3
O	ADVANCED SYSTEMS INC	6- 22	14 7/8	- 1/4	-1.6
O	AGS COMPUTERS INC	7- 32	17	-1 1/2	-8.1
O	AMERICAN SOFTWARE	13- 31	13 1/2	-1	-6.8
N	ANACOMP INC	2- 23	3	- 5/8	-17.2
O	ANALYSTS INTL CORP	5- 20	5 3/8	- 3/8	-6.5
A	APPLIED DATA RES.	8- 37	19 1/4	- 3/4	-3.7
O	ASK COMPUTER SYSTEMS	6- 21	13 3/4	-1 3/4	-11.2
B	ASTRADYNE COMP IND	1- 7	1 3/8	- 3/8	-21.4
N	AUTOMATIC DATA PROC	21- 44	32 1/2	- 7/8	-2.6
O	CGA COMPUTER ASSOC	5- 17	10	- 1/2	-4.7
O	COMPUTER ASSOC INT'L	6- 35	17 1/4	-2 3/4	-13.7
O	COMPUTER HORIZONS	8- 20	10 1/2	-1	-8.6
O	COMPUTER NETWORK	4- 10	5 3/8	- 1/4	-4.4
N	COMPUTER SCIENCES	11- 23	13 3/8	- 7/8	-6.1
O	COMPUTER TASK GROUP	8- 22	14	0	0.0
O	COMPUTER USAGE	2- 22	7 1/2	+ 1/4	+3.4
O	COMPUTONE SYSTEMS	5- 38	4 7/8	- 5/8	-11.3
O	COMSERV CORP	2- 20	3 1/8	- 1/2	-13.7
O	COMSHARE	7- 14	7 3/4	+ 1/4	+3.3
N	CULLINET SOFTWARE	12- 50	31 3/8	- 5/8	-1.9
O	CYCARE SYSTEMS INC	9- 27	17 1/2	+ 1/4	+1.4
N	ELECTRONIC DATA SYST	10- 42	37 5/8	+2 1/8	+5.9
O	HOGAN SYSTEM INC	14- 27	15 3/4	-1 1/4	-7.3
N	GENERAL ELECTRIC CO	45- 59	52 1/2	-1 3/4	-3.2
N	GTE CORP	36- 48	36 3/4	- 3/4	-2.0
N	INFORMATICS INC	10- 34	20	-1 1/2	-6.9
O	INFOTRON SYSTEMS COR	25- 43	29	- 1/4	-0.8
O	KEANE ASSOCIATES	4- 15	9	0	0.0
A	LOGICON	8- 31	20 7/8	+ 1/8	+0.6
O	MCI COMMUNICATIONS	8- 34	8	-1 1/8	-12.3
O	MNGT SCI AMER INC	8- 33	16 5/8	-1 3/8	-7.6
O	MATHEMATICAL APP GRP	7- 22	7 1/2	+ 1/4	+3.4
O	MICOM SYSTEMS INC	25- 50	37 1/2	-1	-2.5
O	MONCHIK-WEBER CP	6- 22	7 3/4	+ 1/8	+1.6
O	NATIONAL DATA CORP	5- 26	16 5/8	- 3/4	-4.3
O	ON-LINE SOFTWARE INT	8- 27	11	0	0.0
O	PANSOPHIC SYSTEMS	8- 30	13 1/2	-1	-6.8
N	PLANNING RESEARCH	6- 21	14 5/8	0	0.0
O	POLICY MGMT SYSTS CP	15- 35	24 1/2	-1	-3.9
O	PROGRAMMING & SYS	1- 8	4 3/8	0	0.0
O	REYNOLDS & REYNOLD	17- 53	33 1/2	0	0.0
O	SEI CORP	11- 34	13 3/4	- 1/2	-3.5
O	SHARED MEDICAL SYST	13- 43	27	-2 1/4	-7.6
O	SCIENTIFIC COMPUTERS	6- 14	8 1/2	- 3/4	-8.1
O	SOFTWARE AG	5- 17	11 3/8	-1 1/8	-9.0
A	URS CORP	5- 18	11 1/4	0	0.0
N	WYLY CORP	7- 17	9 1/4	- 5/8	-6.3

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1983-84 RANGE (1)	CLOSE MAY 23 1984	WEEK NET CHNGE	WEEK PCT CHNGE
P	AM INTERNATIONAL	2- 7	3 3/8	- 1/4	-6.8
A	ANDERSON JACOBSON	7- 26	8 3/8	- 7/8	-9.4
O	AUTO-TROL TECHNOLOGY	8- 29	15 3/4	-1 1/4	-7.3
O	BANCTEC INC	7- 33	7 3/4	- 1/4	-3.1
A	BEEHIVE INT'L	3- 15	3	- 1/8	-4.0
N	BOLT,BERANEK & NEW	5- 30	19 5/8	-1 1/2	-7.1
O	CAMBEX CORP	1- 4	1 3/8	- 1/8	-8.3
N	CENTRONICS DATA COMP	6- 28	10 3/8	- 1/2	-4.5
A	CETEC CORP	4- 12	7 1/2	- 7/8	-10.4
O	CODNITRONICS	2- 20	6 1/4	- 7/8	-12.2
O	COMPUTER DEVICES INC	0- 21	5/8	- 1/8	-16.6
O	COMPUTER TRANSCEIVER	3- 12	2 3/4	0	0.0
N	COMPUTERVISION CORP	19- 53	36 1/8	-1	-2.6
N	CONRAC CORP	14- 38	14 3/4	+ 1/8	+0.8
A	DATAPRODUCTS CORP	16- 41	18 3/8	-2 1/2	-11.9
A	DATARAM CORP	5- 12	8 5/8	- 1/2	-5.4
D	DATA SWITCH CORP	13- 41	20 1/4	- 1/2	-2.4
O	DATUM INC	2- 17	6	- 3/8	-5.8
O	DECISION DATA COMPUT	3- 16	9 1/4	- 3/4	-7.5
D	DOCUTEL-OLIVETTI	7- 39	8	- 3/8	-4.4
N	ELECTRONIC M & M	5- 11	6 3/8	- 1/4	-3.7
O	ENDATA, INC	9- 16	9 1/4	- 3/8	-3.8
O	EVANS & SUTHERLAND	17- 50	17 3/4	-1	-5.3
O	GANDALF TECHNOLOGIES	9- 22	10 1/2	0	0.0
N	GEN'L DATA COMM IND	6- 33	28 3/8	-2 3/4	-8.8
O	GREAT SOUTHWEST IND	1- 6	3/4	- 1/4	-25.0
N	HAZELTINE CORP	7- 31	25 5/8	-1 7/8	-6.8
O	ICOT CORP	3- 10	3	- 1/4	-7.6
O	INFORMATION INTL INC	10- 22	11 1/2	- 1/4	-2.1
O	INFORMATION SCIENCE	8- 17	8 1/2	0	0.0
O	INTEL CORP	11- 45	31 1/2	-2 1/4	-6.6
O	IPL SYSTEMS INC	4- 14	4 1/2	- 1/2	-10.0
A	LUNDY ELECTRONICS	7- 19	9 3/4	- 7/8	-8.2
O	MEGADATA CORP	8- 15	8 7/8	- 1/8	-1.3
A	MSI DATA CORP	14- 37	13 3/4	-1 1/2	-9.8
N	NASHUA CORP	9- 29	24 7/8	-2 1/8	-7.8
O	NETWORK SYSTEMS CORP	8- 34	19 3/8	-2 1/2	-11.4
N	NO AMERICAN PHILIPS	17- 40	31	-2 3/4	-8.1
N	NORTHERN TELECOM LTD	22- 49	31 5/8	-1 3/8	-4.1
O	OMEX	1- 6	1/4	0	0.0
N	PARADYNE CORP	13- 30	14 5/8	-2 1/4	-13.3
A	PENRIL CORP	7- 14	12 1/4	0	0.0
O	PHOENIX AMERICAN INC	7- 17	7 3/4	0	0.0
N	PLESSEY CO (ADR)	26- 41	28	-1 1/4	-4.2
O	PRINTRONIX INC	20- 34	20	-2	-9.0
O	RAMTEK CORP	9- 26	9	0	0.0
N	RAYTHEON CO	36- 58	37	-1 1/2	-3.8
N	RECOGNITION EQUIP	4- 17	12 1/4	-1 1/8	-8.4
N	ROLM CORP	30- 80	34	-1	-2.8
N	SANDERS ASSOCIATES	36-120	37	-1 1/4	-3.2
O	SCAN DATA	1- 3	3/8	0	0.0
O	SCAN-TRON CORP	12- 19	13 1/2	- 3/8	-2.7
N	SCIENTIFIC ATLANTA	9- 23	9 7/8	- 1/4	-2.4
N	STORAGE TECHNOLOGY	9- 33	9 1/4	- 1/2	-5.1
O	SYKES DATATRONICS	3- 27	2 7/8	- 3/8	-11.5
O	SYSTEMS & COMP TECH	20- 39	22 3/4	-2 1/2	-9.9
A	T BAR INC	7- 17	8 7/8	- 7/8	-8.9
A	TAB PRODUCTS CO	5- 20	15 3/4	-1 1/8	-6.6
O	TANDON CORP	9- 35	9	- 5/8	-6.4
A	TEC INC	6- 12	10 7/8	- 3/8	-3.3
N	TEKTRONIX INC	34- 87	57 1/2	-2 1/4	-3.7
N	TELEX	5- 32	22 3/8	-1 1/8	-4.7
O	TESDATA SYSTEMS CP	3- 17	4 3/4	- 1/8	-2.5
N	TIMEPLEX INC	7- 29	15 1/8	- 5/8	-3.9
O	VISUAL TECHNOLOGY	9- 26	12 1/2	- 1/8	-0.9

SUPPLIES & ACCESSORIES

EXCH		PRICE 1983-84 RANGE (1)	CLOSE MAY 23 1984	WEEK NET CHNGE	WEEK PCT CHNGE
N	AMERICAN BUS PRODS	7- 23	20 1/4	- 1/8	-0.6
N	BARRY WRIGHT	13- 33	23 1/2	-2 1/2	-9.6
A	DUPLEX PRODUCTS INC	12- 27	23 7/8	+ 1/8	+0.5
N	ENNIS BUS. FORMS	6- 28	19 1/2	- 1/2	-2.5
N	3M COMPANY	49- 90	74	-1 5/8	-2.1
N	MOORE CORP LTD	26- 51	36 3/8	-1 1/4	-3.3
D	STANDARD REGISTER	11- 35	34 1/2	- 1/2	-1.4
N	WALLACE COMP SERVICE	11- 33	25 1/4	-1 1/4	-4.7

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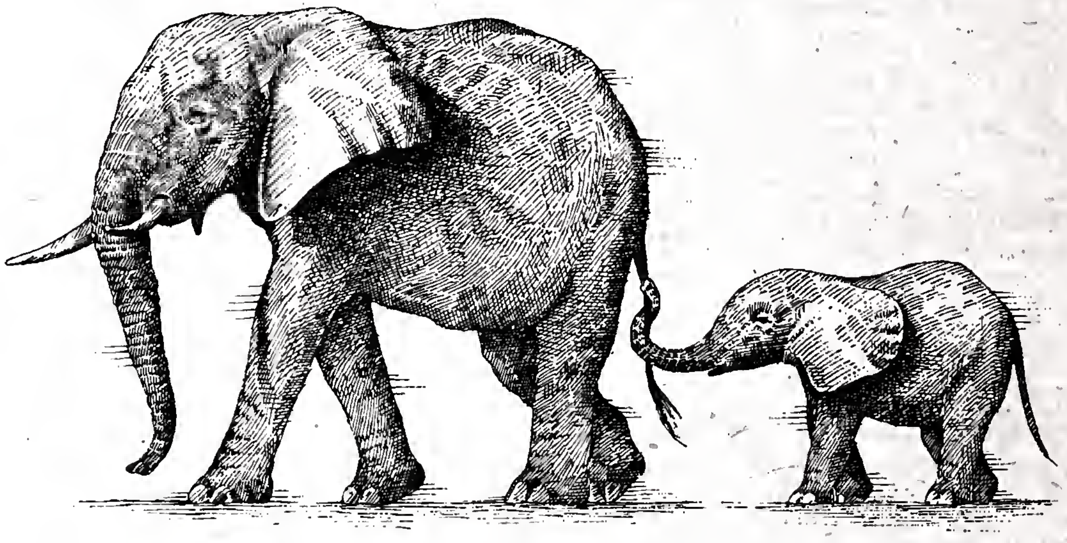

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